Supplement to Site-Specific Health and Safety Plan Operable Unit No. 2

for

Rocky Flats Plant

In Compliance with
DOE ORDER 5400.1

Document Control Number
RFP/ER-SAF-93-OU2.1

Supplement to Site-Specific Health and Safety Plan Implementation of Phase II RFI/RI Work Plan

Rocky Flats Plant Operable Unit No. 2

Surficial Soil Program at Rocky Flats Plant

Prepared for:

THE U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE
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OPERABLE UNIT NO. 2

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EG&G/ALARA	M.C. FRANCHUK [signature]	1-24-95
EDS	[signature] M.C. Brooks	1-24-95

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Approved by:

12/6/93
Director, Environmental Science and Engineering

12/8/93
Project Manager

12/10/93
QA Program Manager

1.0 INTRODUCTION

1.1 POLICY

This Supplemental Health and Safety Plan (HSP) was developed for the implementation of activities associated with the existing Surficial Soil Program (SSP) project which is located east of the 903 Pad and is associated with Operable Unit 2 (OU2). This plan supplements the most recent version of the OU2 Site-Specific HSP (SSHSP). It has been developed for compliance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response Regulations 29 Code of Federal Regulations (CFR) 1910.120 for hazardous waste site workers at the Rocky Flats Plant (RFP). The intent of the supplement is to define the hazards which may be present and identify the procedures which will be followed to protect all project personnel from those hazards. This supplement shall also apply to all subcontractors who are participating in the field activities of this project. This plan addresses the requirements for personnel managing, monitoring, and performing activities associated with the SSP project. All subcontractor personnel will follow this HSP in addition to the requirement of the SSHSP and all RFP procedures and policies when conducting work at the project site. A signature sheet will be kept to document that all site workers have read, understand, and will comply with all aspects of this plan. The subcontractor has the responsibility for implementing the requirements of this SSHSP. The subcontractor will provide health and safety briefings, field activity oversight, and maintain appropriate health and safety records.

1.2 REGULATIONS AND GUIDELINES

Adherence to applicable federal, local, and national consensus organization health and safety standards, regulations, and guidance manuals is required during field activities of the SSP. These include, but may not be limited to, the following:

- 29 CFR 1910, Occupational Safety and Health Standards, General Industry (latest edition);
- 29 CFR 1926, Occupational Safety and Health Standards, Construction Industry (latest edition);
- Nuclear Regulatory Commission 10 CFR 20 (latest edition);
- Department of Energy (DOE) Order 5480.11 (with revisions);
- Radiological Operating Instructions (ROI), EG&G Rocky Flats, Inc. (with revisions);
- Environmental Management Radiological Guidelines (EMRG) Manual, EG&G Rocky Flats, Inc. (with revisions);
- Health and Safety Practices Manual (HSPM), EG&G Rocky Flats, Inc. (with revisions);
- Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists (latest edition);
- Occupational Safety and Health Guidance for Hazardous Waste Site Activities, U.S. Department of Health and Human Services et al., October 1985.
- Radiological Control Manual, DOE, June, 1992.

1.3 CONTENTS OF PLAN

This plan describes known hazardous materials and work operations associated with the activities of the SSP. The plan specifies responsibilities and authorities of the subcontractor and subcontractor personnel involved in the supervision of activities at this site. This plan further describes the requirements for medical surveillance, personal protective equipment (PPE), hazard communication, training, monitoring, decontamination, site control, and emergency response procedures.

The potential hazards associated with the SSP activities have been assessed by reviewing historical activities, previously performed studies, and personal communications with previously associated project personnel. Based on the hazard assessment, plans for PPE, monitoring, decontamination, site control, and emergency response have been developed.

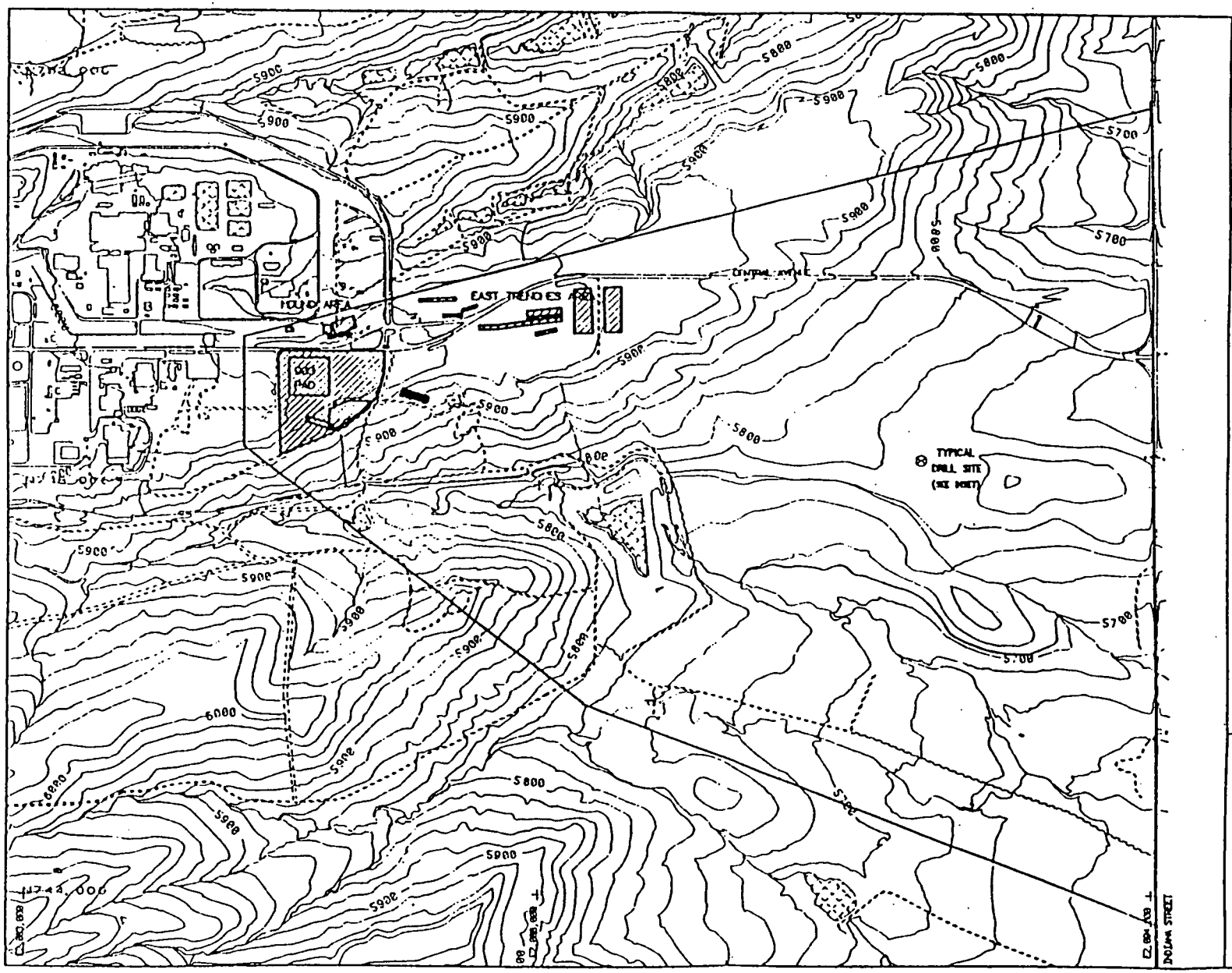
1.4 BACKGROUND

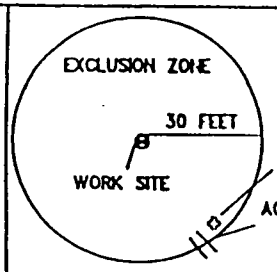
A comprehensive, phased program of site characterization, remedial investigations, feasibility studies, and remedial/corrective actions is in progress at RFP. These investigations are being conducted pursuant to the 1986 Compliance Agreement between DOE, the U.S. Environmental Protection Agency (EPA), and the Colorado Department of Health, which addresses hazardous and radioactive mixed waste management at the plant.

The SSP supports the alluvial work plan for the Phase II Resource Conservation and Recovery Act (RCRA)/Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Remedial Investigation (RI) of OU2 and site wide characterization of soils at RFP. The SSP investigates the physiochemical attributes of actinides in soil east of the former storage site (locally known as the 903 Pad) as well as the temporal changes in actinides in the soil environment around RFP. Refer to Figure 1.4-1 for the location of the project.

The seven tasks that will be performed by this project include;

- Sample Soil Interstitial Waters for Actinides Analyses
- Maintain and Enhance the Soil Water Monitoring System
- Support and Calibrate the Time Domain Reflectometry
- Support Rain Simulation Experiments
- Installation and Support of Snow Water System
- Support Soil Erosion Studies
- Conduct Annual Soil Sampling for Actinides around RFP



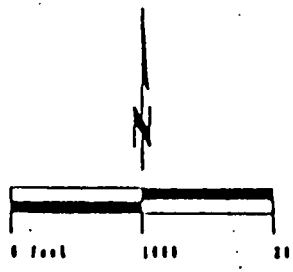


Surficial Soil Program

OPERABLE UNIT 2 CONTAMINANT REDUCTION ZONE

DRILL SITE

EXCLUSION ZONES



U.S. DEPARTMENT of ENERGY
Rocky Flats Plant, Golden, Colorado

SITE CONTROL MAP FOR
OPERABLE UNIT 2
HEALTH AND SAFETY PLAN

FIGURE 1

1.5 LOCATIONS AND DESCRIPTIONS

The SSP is located in the Americium Zone east of the 903 Pad. The 903 Pad was used as a temporary storage area for radioactive materials. Subsequent remediation efforts allowed airborne release of some of these materials. The areas down wind of this pad have been since referred to as the Americium Zone. The project site has been designated as a Radiologically Controlled Area (RCA). Previous activities in the project area involved intrusive operations during installation of equipment. The activities involved with the present phase of the SSP project are not expected to require significant intrusive operations.

2.0 HEALTH AND SAFETY RESPONSIBILITIES

2.1 INTRODUCTION

Health and safety is the responsibility of all personnel working on the site. The subcontractor (Stoller) will provide the required health and safety services including daily sampling, screening all personnel and equipment for radionuclides, briefings, and oversight. Stoller has expressed a strong commitment to ensuring a safe work environment for all workers on the project. The project organization (Figure 2.1-1) will follow the lines of responsibility as described in EMRG Guideline 1.0. As contracted, a qualified individual may serve in more than one role. Individual contracted project personnel responsibilities are identified in the following sections.

2.2 ASSIGNMENT OF RESPONSIBILITIES

2.2.1 Stoller Program Manager

The Stoller Program Manager for the SSP project has overall responsibility for work performed by Stoller and subcontractors at the site. The Program Manager, through line management and supervisors, has responsibility for implementing and abiding by the SSHSP. The Project Manager has appointed a employee to serve as the Site Safety Officer (SSO). Stoller personnel and all subcontractors will review and comply with this SSHSP prior to initiating work at the site.

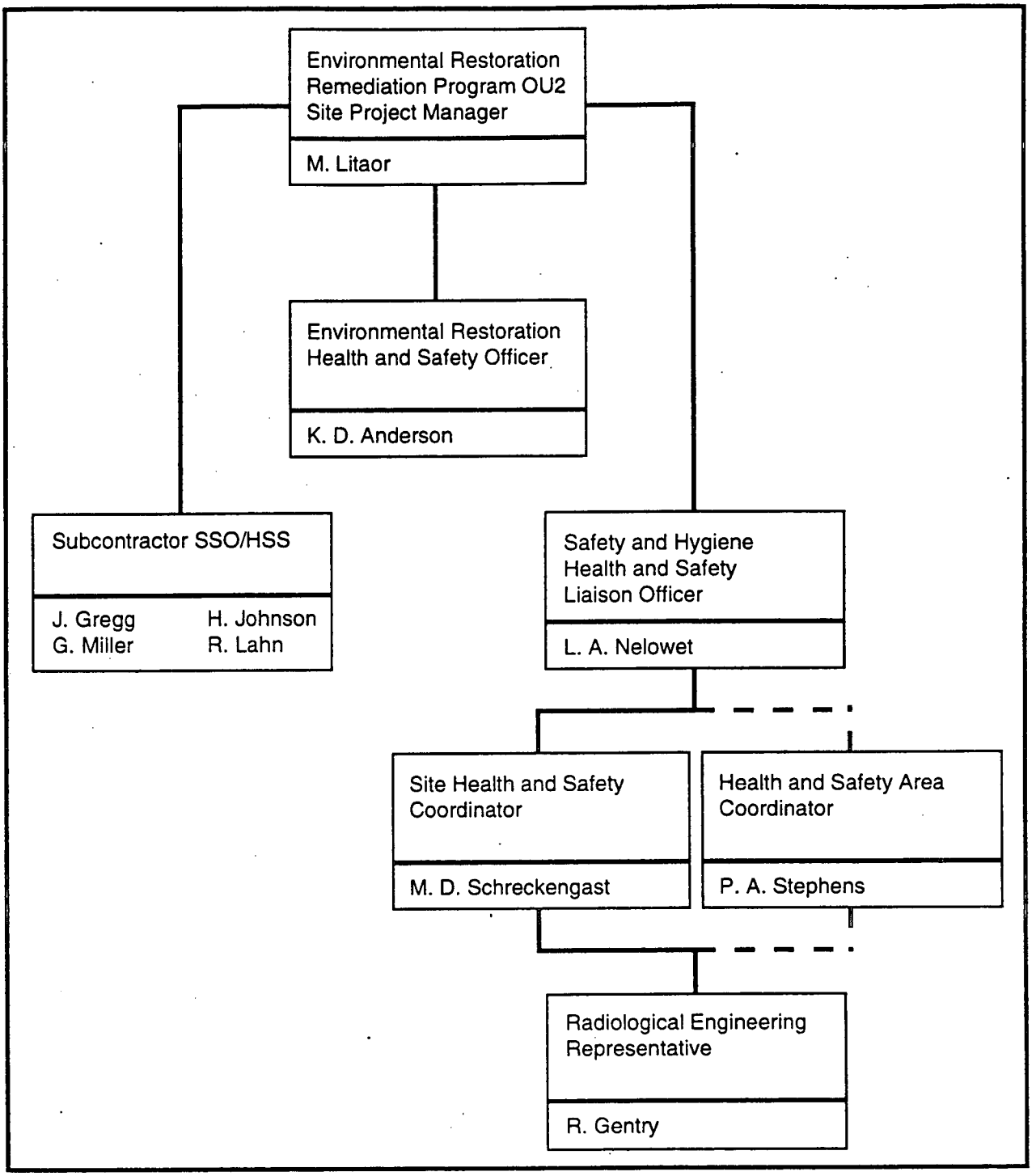


Figure 2.1-1 Safety and Health Organization for Surficial Soil Program (OU2)

2.2.2 Site Safety Officer

The Site Safety Officer (SSO) is responsible for implementing the supplemental SSHSP that adequately addresses the site hazards and controls necessary to safeguard personnel and property. Duties of the subcontractor SSO include the following:

- Providing requisite physical examination requirements to subcontractor employees working at hazardous waste sites;
- Correlating exposure data to ensure that the scope of annual physical examinations are correct;
- Informing employees of potential exposures to hazardous materials based on bio-assays;
- Ensuring that personnel are adequately trained so that they can safely perform their assigned tasks;
- Ensuring that personnel are aware of potential site hazards, and that they know the necessary controls to prevent overexposure or injury by conducting site-specific briefings;
- Appointing alternate SSO(s);
- Ensuring that the SSHSP and the required training and medical records for site personnel are current and are maintained on-site;
- Ensuring that all personnel have read and signed the SSHSP. A copy of the signed SSHSP must be kept in the work trailer;
- Conducting the required monitoring or assuring that monitoring is conducted by the assigned personnel;
- Coordinating with the EG&G Project Manager regarding the need for additional safety support required for the SSP project;
- Performing audits of subcontractor health and safety operations;
- Approving modified work practices in response to changing conditions; and
- Document control and distribution of any revisions to the SSHSP.

2.2.3 Health and Safety Specialist

The SSO for the SSP project has the responsibility for assigning an Health and Safety Specialist (HSS) to provide oversight and monitoring of field operations. The key responsibilities of the HSS is:

- Monitoring the project to ensure that the requirements of this SSHSP are implemented;
- Alerting the Program Manager and the SSO of health and safety violations;
- Performing tests to minimize the potential for exposure of field personnel and verify that equipment leaving the RCAs or areas of suspected/potential soil contamination is in compliance with applicable regulations and standard operating procedures (SOPs);
- Monitoring soil surfaces and samples and will perform decontamination verification by frisking and smear testing;
- Ensuring that field crews are in compliance with EG&G radiation work permits (RWPs); and
- Performing duties in accordance with the EG&G EMRGs with the approval of EG&G Radiological Engineering.

2.2.4 Field Technicians

The field technicians are responsible for implementing and abiding to all provisions of the SSHSP and the supplement specific to this SSP project.

2.2.5 Fire Protection Representative

The fire potential during environmental investigations does not justify the cost of providing an independent Fire Protection Representative. Fire prevention is expected to be largely a matter of good housekeeping. In the event of a fire, EG&G Fire Department will be notified and all subcontractor personnel will withdraw from the area. Should any personnel sustain injury, RFP Emergency Medical Services will be immediately notified. The EG&G emergency number is 966-2911.

2.3 SURFICIAL SOIL PROGRAM (SSP) PROJECT PERSONNEL

Project Title	Name (Company)	Phone
Program Manager	Allen Crockett (Stoller)	(303) 449-7220
SSO/HSS	John Gregg (IT)	(303) 793-5200
SSO/HSS	G. Miller (Woodward-Clyde)	(303) 694-2770
SSO/HSS	R. Lahn (Woodward-Clyde)	(303) 694-2770
Technician	Steve Aldrich (Stoller)	(303) 443-7220

2.4 EG&G PERSONNEL

	Name	Extension
Radiological Engineering Representative	K. Gentry	x5151
Industrial Hygiene/Site Health and Safety Coordinator	P. Schreckengast	x5471
Environmental Restoration Health and Safety Officer	K. Andersen	x8577

3.0 HAZARD ASSESSMENT

3.1 INTRODUCTION

The field work that will be conducted as part of the SSP includes potential radiological, physical, biological, and mechanical hazards. These potential hazards were identified by reviewing site histories, previous sampling results, and the work plan for the project. The use of standard measures such as PPE, work site radiological monitoring, work practice controls, and training should assist in identifying, evaluating, and controlling potential hazards at the work site that are not currently known.

Based on available information about the site, field work will be conducted in areas where the severity of potential hazards is expected to be low. The potential for encountering radio-logical hazards will depend on the types of compounds at the site, work practices, and field activities to be performed. Environmental physical and biological hazards, such as insects, heat, and cold stress may be encountered to some degree while working at the site. The degree of mechanical hazards resulting from motor vehicle, field equipment, power tools, etc., will also depend on the work being performed. The rational for monitoring and PPE are presented in Sections 9.0 and 6.0, respectively.

Field activities at the SSP project will involve the following operations:

- Non-intrusive operations such as assisting in radiological surveys and water sampling from existing installations. These operations do not disturb the soil and are not expected to approach occupational exposure limits.
- Intrusive operations such as installation of snow water instruments. These operations disturb soil and have the potential to re-suspend contaminated subsurface soils. The quantities of spoils produced is small. Dust generation will be minimized by misting soils with water. The Plan for the Prevention of Contaminant Dispersion (PPCD) developed by EG&G addresses dust emissions and will be complied with by Stoller.

3.2 POTENTIAL HAZARDS

3.2.1 Pathways and Exposure Routes

Pathways of exposure to hazards are directly dependent upon investigative activities performed at the SSP site. Exposure to potential health hazards may occur during field activities involving soil interstitial water sampling and other sampling and measurement efforts. Exposure pathways include the following:

- Inhalation of fugitive dust containing radionuclides;
- Skin contact with radionuclides;
- Inadvertent ingestion of dust particles or fugitive dust contaminated with radionuclides; and
- Injection of radionuclides into the body through wounds.

3.2.2 Radiological Hazards

3.2.2.1 Airborne Exposures to Radiological Hazards — Exposure to radiological hazards could occur through inhalation of fugitive dust contaminated with radiological materials. The degree of potential exposure to airborne radiological hazards is considered unlikely or low depending on the individual work site and amount of air-borne dust created at the site. Most work sites reportedly have low or below background levels of radionuclides and the intrusive activities to be performed usually generate low quantities of airborne dust. Unknown radiological contamination at the site (e.g., buried contaminated material in the landfill) could lead to unexpected generation of airborne radiological hazards. The use of initial site surveys, air monitoring, work practice controls (e.g., minimizing dust generation), dust control practices, and proper use of PPE, and respirators will be the primary evaluation and control measures used to prevent inhalation of radioactive materials. If an inhalation exposure is suspected the provisions of EMRG 2.2 - Possible Inhalation Exposure will be followed.

3.2.2.2 Skin Exposures to Radiological Hazards — Radioactive materials identified at sites in OU2 are not readily absorbed through the unbroken skin. Contamination avoidance, decontamination, and proper use of protective clothing and gloves will be the primary control methods used to prevent skin contamination.

3.2.2.3 Inadvertent Ingestion of Radionuclides — Ingestion of radionuclides is possible during site work. The potential for exposure via this pathway is considered to be remote if good personal hygiene practices are followed prior to eating, drinking, or smoking. No eating, drinking, smoking, or chewing of tobacco or chewing gum will be allowed in the contamination reduction zone (CRZ) or the exclusion zone (EZ).

3.2.2.4 Puncture Wounds — Radiological materials could enter the body through breaks in the skin caused by a cut, laceration, puncture, abrasion, or burn. This route of entry can be controlled by complying with safe work practices to prevent accidents. If accidents occur possibly leading to radiation exposure, ROI 2.3 or EMRG 2.3 procedure will be implemented.

3.3 PHYSICAL HAZARDS

Workers at SSP sites within OU2 are potentially subjected to physical stresses including heat and cold stress and noise exposure. Investigative activities may take place during a wide range of weather conditions leading to possible heat or cold stress conditions. Unacclimatized workers or workers wearing impermeable personal protective clothing during warm weather may be susceptible to heat stress. The "buddy" system will be used and all personnel shall be aware of the signs and symptoms of heat/cold stress on themselves or their "buddy." High noise exposure is possible when operating power tools and mechanized equipment.

3.3.1 Cold Exposure

When working outdoors in temperatures below freezing, workers are susceptible to frostbite. Exposure to extreme cold can cause severe injury to the body surface or can result in profound generalized cooling, causing death. In cold weather, precautions should be taken to prevent cold

exposure by wearing properly insulated garments and taking warm-up breaks in temperature controlled areas when necessary. Symptoms of cold exposure include the following:

- Incipient frostbite or frost nip, characterized by sudden blanching or whitening of the skin.
- Superficial frostbite, which causes the skin to become waxy or white and superficially firm, but resilient beneath.
- Deep frostbite, characterized by cold, pale, solid skin tissues.
- Systemic hypothermia, caused by exposure to freezing or rapidly dropping temperature. Symptoms are usually exhibited in stages. These include shivering, apathy, listlessness, sleepiness, rapid cooling of the body temperature to less than 95° Fahrenheit (F), unconsciousness, glassy stare, slow pulse and slow respiratory rate, freezing of the extremities, and death.

3.3.2 Heat Stress

A worker's risk for developing heat stress is greatly increased when wearing impermeable, personal protection clothing. This type of clothing limits the body's normal heat exchange mechanisms and increases energy expenditure. A program to recognize potential heat stress situations, prevent episodes, and control hazards will be implemented when the SSO/HSS deems it necessary. The program will include heat stress monitoring, adequate rest breaks, fluid replacement, acclimatization, and personal cooling systems. Heat stress can cause health effects that range from heat fatigue to serious illness or death. Signs and symptoms of heat stress include the following:

- Heat rash, which may result from continuous exposure to heat or humid air.
- Heat cramps, caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include muscle spasms, or pain in hands, feet or abdomen.
- Heat exhaustion, which occurs from increased stress on various body organs or systems, including inadequate blood circulation due to cardiovascular system inefficiency or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; or fainting.

Personnel having symptoms of heat exhaustion will be immediately removed from field work. Protective equipment will be removed and vital signs monitored. If body temperature exceeds 101° F the individual will be transported to the medical facility for evaluation.

Heat stroke is the most serious form of heat stress. The body's temperature regulation system fails, and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Signs and symptoms of heat stroke are red, hot, usually dry skin; reduced or lack of perspiration; nausea; dizziness and confusion; strong, rapid pulse; or coma. The body temperature often exceeds 102° F.

If signs of heat stroke are detected, the emergency should be immediately reported by calling 2911. The individual's protective clothing will be removed and they will be cooled by flushing with water that is close to body temperature. The individual will be transported for further evaluation/treatment to the medical facility determined by the responding Emergency Medical Technicians. Appendix B provides additional guidance for the prevention, monitoring, and treatment of heat stress.

3.3.3 Noise Exposure

Workers are not anticipated to be exposed to high noise levels during sampling and maintenance activities of the SSP.

3.3.4 Explosive Hazards

No explosive hazards are anticipated during sampling and maintenance activities of the SSP.

3.4 BIOLOGICAL HAZARDS

Biological hazards that may be present at RFP include plants, insects, and snakes. Considerations for potential biological hazards may be necessary when workers are required to enter remote or seldom-visited locations.

The potential for contact with snakes or insects that may cause injury or disease exists when performing field activities at RFP. The RFP does not host any plants that are poisonous to humans, other than poison ivy. There are some plants that may be mechanically injurious (i.e., thorns, yucca). Field personnel will wear sturdy work clothes and steel-toed boots in order to help prevent injuries.

There is one type of venomous snake present in the RFP area, the prairie rattlesnake. Personnel should be aware that snakes may be present in the area and exercise caution, especially when working in previously undisturbed areas and locations with animal dens.

Black widow spiders may be present at SSP sites. They are usually found in shady places or under rocks or wood. The black widow spider has a shiny black body about the size of a pea, with a red or yellow hourglass-shaped mark on its abdomen. It weaves shapeless webs in undisturbed areas. A bite may result in severe pain, illness, and possibly death from complications, but usually not from the bite itself.

In addition to spiders, ticks, chiggers, bees, and wasps may be nuisances to field personnel. Bites from wood ticks may result in the transmission of Rocky Mountain Spotted Fever, a serious and possibly fatal viral disease. The Rickettsia virus infects wood ticks, mostly in the late spring and early summer, and is characterized by chills, fever, severe pain in leg muscles and joints, and a body rash. Lyme Disease is not prevalent in Colorado. Some protection will be offered by PPE, but the use of insect repellant (containing at least 30 percent DEET) on outside clothing and exposed skin also may be warranted. Personnel should perform self-searches after each day to check for ticks and chiggers. Bees or wasps can be considerable hazards for those people with allergic reactions to venom. The SSO should be notified if any worker is sensitive to these insects. Properly trained personnel will administer first aid should a bee or wasp sting occur.

3.5 MECHANICAL HAZARDS

Workers may be exposed to potential mechanical hazards during the field activities of the SSP project. Hazards and methods of hazard control are detailed in EG&G SOPs and operation safety

analyses for specific tasks performed during field activities. Site inspections will be conducted periodically by the SSO to assess hazards according to standard health and safety protocols.

3.6 HAZARD CONTROL METHODS SUMMARY

The control measures listed below are the minimum control measures required for work at the SSP site. Additional control measures may be necessary as determined by site health and safety personnel. As additional site data become available through site monitoring or investigations, the control measures may need to be altered. The decision to alter the control measures will be made by the SSO/HSS.

3.6.1 903 Pad

3.6.1.1 Site Background Summary — Starting in 1958, barrels containing used machining fluids were stored outdoors at the location now called the 903 Pad. Leakage from the barrels was discovered in 1964. By 1968 the last barrels had been removed and the area was monitored for alpha activity. Levels up to 13.5 micro Curies per gram of soil were found, with activity penetrating to 8 inches deep.

3.6.1.2 Anticipated Work Activities — No work will be conducted at the 903 Pad site.

3.6.2 Surficial Soil Program (SSP) Site

3.6.2.1 Site Background Summary — The distribution of radioactive dusts at the RFP has been driven by prevailing west to east wind and drainage patterns. As the existing SSP site is east of both the 903 Pad and the entire RFP, the site has been impacted by historical radionuclides releases.

3.6.2.2 Anticipated Work Activities — Project personnel will conduct non-intrusive activities such as water sampling from existing installations, piezometer readings, site inspection, and radiation monitoring activities at the site.

3.6.2.3 Potential Radiological Hazards — Expected concentrations of plutonium - 239 (Pu239) near the areas of this project are thought to be approximately 0.05 pico Curies per gram (pCi/g). The background concentration is 0.02 pCi/g. Americium241 is a contaminant of weapons-grade plutonium, present at less than 20 percent of the concentration of Pu239. Uranium238 is also know to be present in some soils at the site. These radionuclides pose a health hazard due to alpha particle emissions. Alpha (He2+) is not sufficiently penetrating to penetrate the dead layers of skin, which means that these radionuclides do not pose an external hazard. However, it is very important to avoid inhalation or ingestion of these compounds as alpha radiation may be very damaging from within the body.

3.6.2.4 Control Measures — The project area has been designated as a RCA. Modified Level D protection including cotton coveralls, tyvek coveralls, safety boots, disposable boot covers, eye protection, gloves will be worn during all activities in the RCA. Leather gloves over two layers of latex inner gloves will be worn when handling dry materials to prevent cuts/abrasions. Radiological screening and monitoring in accordance with EG&G SOP FO.16 will be performed during all field work. Decontamination procedures as discussed in Section 7.0 will be followed for general equipment. Face and hands will be washed after leaving the site and before eating, drinking, or smoking.

4.0 HAZARD COMMUNICATION

4.1 INTRODUCTION

Project personnel and all subcontractors must follow established work practices to safely handle hazardous chemicals. The implementation of a hazard communication program is also required by 29 CFR 1910.120 for RCRA treatment, storage, and disposal facilities. The SSO/HSS will maintain an inventory of hazardous chemicals stored at the project trailer and material safety data sheets (MSDSs) for those chemicals that will be available to employees at the site.

4.2 HAZARDOUS MATERIALS INVENTORY

The SSO/HSS will compile an inventory of hazardous chemicals present at their work sites or trailer areas and provide this information to EG&G Industrial Hygiene Department. The inventory may be requested by emergency response personnel to aid in identifying hazards associated with a spill or accident at the site. Radiological check sources and/or reference sources must also be included in this inventory including applicable calibration certificates.

4.3 MATERIAL SAFETY DATA SHEETS (MSDSs)

The MSDS must be readily available to employees for hazardous chemicals used or stored at the site. Information found on a MSDS includes identification of the product's hazardous chemical constituents, its physical characteristics, applicable exposure limits, symptoms of overexposure, recommended PPE, fire and explosion hazards, and spill response actions. This information is provided by the manufacturer and is typically included with the shipment of the chemical. The EG&G Industrial Hygiene Department maintains a master file of MSDS for materials stored or used at the plant. A complete file of MSDSs for hazardous chemicals used at the SSP project will be kept at the project trailer and readily available to site personnel.

4.4 TRAINING

Project personnel and all subcontractors are required to complete Hazard Communication training as part of their 40-hour OSHA training. Specific training on the information provided in the project MSDSs will be conducted by the SSO/HSS, or, if necessary, by a representative of the EG&G Industrial Hygiene Department. Specific hazards associated with the project will be communicated to workers at the site-specific briefing and then at the weekly safety

5.0 SITE CONTROL

5.1 OBJECTIVES

The purpose of this site control plan is to protect workers, the public, and the environment from the potential hazards associated with the OU2 SSP. In addition to general site control measures required under the 29 CFR 1910.120, activities conducted at SSP shall be conducted in accordance with the EG&G Integrated Work Control Program (IWCP). Project personnel will adhere to requirements of the IWCP. A RWP is required as part of the IWCP in the project area since the area has been designated as a RCA. Information required for the RWP includes job information, description of hazards, radiological and non-radiological safety requirements, preparation for the job, approval signatures, and permit duration.

5.2 SITE CONTROL DESIGNATIONS

The project work area has been designated an RCA and has been roped off and posted as required. This roped off work area itself is designated as an EZ and the staging area outside a work location is designated as a CRZ. Access to these areas will be controlled. Personnel working in the areas must meet specific training requirements, be participants in a medical surveillance program, and wear required PPE. Minimum requirements for access to these designated areas are summarized below. Detailed PPE, training, and decontamination requirements are presented in the respective sections of this plan.

5.2.1 Exclusion Zone (EZ)

The limits of the EZ have been established and marked by yellow rope and postings. The PPE requirements within the zone have also been established based on the hazards of the work being conducted, as determined by the appropriate health and safety representative. Environmental samples collected at these sites may contain elevated levels of radiological contaminants. Personnel entering these areas will be required to wear appropriate PPE. When leaving these areas,

decontamination procedures (described in Section 7.0) will be followed where required, including clearance by the approved SSO/HSS.

The EZ is also an RCA based on the historical data. A RWP and a site access log will be posted at the entrance to the EZ. Entry and exit requirements shall be posted as per ROI 1.03.

5.2.2 Contaminant Reduction Zone (CRZ)

Adjacent to the EZ is the CRZ, where appropriate measures will be in effect to reduce the potential for spreading contamination via the workers and equipment. The entrance, exit, and decontamination area adjacent to the EZ will be designated as a CRZ. All personnel conducting or supervising activities in this area are required to have appropriate training.

5.2.3 Support Zone

The Support Zone will be outside the CRZ and will be the area where support workers will provide assistance to workers inside the EZ and CRZ. The Support Zone will begin at the exit from the decontamination line. Only clean or appropriately containerized equipment or material will be allowed to exit into the support zone from the CRZ. Visitors and observers will comply with the site control designations and the zone requirements established at the work site. Visitors will not be allowed to enter the EZ and/or CRZ without training as required in Section 10.0 of this SSHSP.

5.3 COMMUNICATION WITHIN CONTROL ZONES

Personnel will not conduct work activities alone. They will be accompanied by either another employee or subcontractor employee. The buddy system, as specified in 29 CFR 1910.120 (d)(3), will be implemented at the site. The buddy teams working at the site will maintain visual and audible contact so that they can provide emergency assistance to each other, if needed. Both members of the buddy team need not be in the same site zone, but each member must be wearing adequate PPE to assist the other, if necessary.

The communication system at the site consists of hand-held radios. Project personnel will rely on the EG&G hand-held radio system used by personnel performing the project work.

5.4 PLAN FOR THE PREVENTION OF CONTAMINANT DISPERSION (PPCD)

5.4.1 Objective

The objective of the PPCD is to establish procedural requirements to mitigate potential hazards to the general public as a result of contact with emissions resulting from intrusive RI activities.

5.4.2 Scope

Procedural requirements for the prevention of contaminant dispersion, applicable to intrusive actions as part of the RFI/RI activities described in the Interagency Agreement, are described in the PPCD prepared by EG&G. Intrusive activities that fall within the scope of this PPCD are those with the potential for producing suspended particulate, primarily through mechanical actions.

6.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

6.1 INTRODUCTION

The use of PPE is required when engineering and administrative controls are insufficient to prevent worker exposures to radioactive materials. Due to the nature of work performed at OU2, there is a potential for release of contaminated particulates which cannot be completely controlled at the source. Engineering and administrative controls will be used, when appropriate, to minimize potential worker exposures to the site contaminants; however, the use of PPE will be necessary to maintaining exposure as low as reasonable achievable (ALARA).

This PPE program defines the minimum level of protection that has been designated for the SSP project. The contingency protective equipment requirements are also defined. The PPE requirements will be re-evaluated by the site SSO/HSS as the work proceeds and recommendations for modifications to this program will be made to the Program Manager by the project SSO as required.

EG&G personnel, DOE representatives, or other authorized site visitors requiring access into areas zoned as restricted will follow the personal protective equipment requirements set in this plan.

6.2 PPE ISSUES APPLICABLE TO ALL SITE PERSONNEL

All personnel assigned to OU2 and the SSP must be trained in the proper inspection and use of the PPE used on this project before beginning work on the site. This training requirement is fulfilled through completion of the 40-hour OSHA course discussed in Section 10.0, Training, but site-specific training will cover the PPE requirements of this project.

All personnel working on this project who may be required to wear an air-purifying respirator must have a current medical clearance issued by a qualified physician and a fit test certificate for the size and make of respirator used. This clearance will be updated annually with the employee's physical exam as described in Section 8.0 of this plan.

The SSO and individual team members are responsible for the inspection of their own and their team member's equipment during donning and field use. Personnel who are having equipment difficulties or experience tears in their suits should proceed directly to the CRZ for repairs or replacement of their equipment. If an exposure to site contaminants is suspected as a result of equipment failure, immediately contact the SSO or the EG&G Industrial Hygiene Department.

6.3 COMPONENTS OF LEVELS OF PROTECTION

OSHA and the EPA define four levels of protective equipment ensembles in the 29 CFR 1910.120 regulations, Levels A, B, C, and D. Levels A and B specifying the use of self- contained breathing apparatus are not addressed in this plan. If either of these levels of protection are required due to the presence of extreme site hazards, this situation will be handled as a separate amendment to this plan.

The levels of protection that are defined for this project include Level C, Level D, and a modified Level D. The specific equipment that is identified for each of these general ensembles is listed in Table 6.3-1.

6.4 LEVELS OF PROTECTION FOR SITE ACTIVITIES

The minimum safety equipment required for all personnel on this project site includes a hard hat, EG&G coveralls, and steel toed shoes. No workers, visitors or other personnel will be allowed on this project without these safety items even in the non hazardous areas. Minimum levels of PPE by activity are listed in Table 6.4-1.

All non-intrusive activities will be performed in a modified Level D with skin, hand, and boot coverings. Intrusive activities will initially be performed in Level C (air purifying respirators) until the air quality can be characterized and a lower level of protection can be proposed. The decision to downgrade the level of protection will be made with the concurrence of the SSO, the Program Manager, and the EG&G PM.

Table 6.3-1 Specific Requirements for Each Level of Protection

Level of Protection	Equipment	Protection Provided	Should Be Used When	Limiting Criteria
D	Required: • Steel-Toed Boots or Shoes • Long-Legged Pants • Safety Glasses or Chemical Splash Goggles Optional, As Required • Work Gloves • Coveralls • Hearing Protection	No respiratory protection. Minimal skin protection.	• The atmosphere contains no known hazard. • Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals	• May be worn in support or the CRZ. This level should not be worn in the EZ. The atmosphere must contain at least 19.5% oxygen.
Modified D	Required: All Rqmts of Level D Plus: • Chemically Protective Suite – Tyvek or Polyethylene Coated Tyvek Inner and Outer Gloves • Chemical-Resistant Safety • Boots/Shoes or Steel-Toed Work Boots with Latex Overshoes (Taped to Suit) Options, As Required: • Splash Shield • Hearing Protection • Eye Protection	Increased skin and splash protection, but no respiratory protection.	Working in dusty areas or in areas with splash potential where low inhalation hazard is presented.	• May be worn in the EZ if the area has been demonstrated to be free of air contaminants above the action levels. The atmosphere must contain at least 19.5% oxygen.
C	Required: • Full-facepiece, air-purifying respirator equipped with organic vapor and HEPA filter cartridges. • Chemically protective clothing dependent on the specific area: – Tyvek full body suit for dry areas, – Polyethylene coated Tyvek for when splash hazards exist. • Inner latex glove and outer nitrile gloves (taped to suit). • Chemical-resistant safety boots/shoes or steel-toed work boots with latex overshoes (taped to suit). • Hard hat. • Two-way radio communications. Optional, As Required: • Coveralls under chemically protective suit. • Face shield for splash protection. • Long cotton underwear.	Respiratory protection up to 50 times the permissible exposure level of selected contaminants (i.e., particulates and some organic compounds), and skin and splash protection from contaminated dust and water.	• The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any exposed skin. • The types of air contaminants have been identified, concentrations measured, and a canister is available that can remove the contaminant. • All criteria for the use of air-purifying respirators are met.	• Atmospheric concentration of chemicals must not exceed immediately dangerous to life or health levels. • The atmosphere must contain at least 19.5% oxygen.

Table 6.4-1 Minimum Levels of PPE by Activity

Work Activity	Initial Level of Protection	Additional Comments	Contingency PPE
Project Activities in Non-RCA Areas	Level D	No contact or access to contaminated areas is permitted for personnel in this level of protection.	No significant exposures to any of the site contamination is expected.
Site Activities in RCA	Modified Level D	Tyvek suits, gloves, and boot covers are required for all access into the EZ regardless of activity.	Upgrade to Level C if air monitoring action levels are exceeded (See Section 9.0).
All Intrusive Activities in the EZ	Level C	Tyvek suits can be used during activities with no splash hazards. Water sampling and work around the pond requires the use of PVC suits.	Downgrade any intrusive activity level of protection if no significant inhalation hazards are posed to workers. If upgrade is necessary, contact SSO and PM.

6.5 REUSE OF PPE

All disposable protective equipment (Tyvek suits, gloves, etc.) must be removed and disposed of whenever a worker leaves the EZ. This includes leaving the site after five minutes or a full day. The length of the service life of a respirator cartridge, with activated carbon or other chemical adsorbing element, will be determined by the following criteria:

- Breathing resistance becomes excessive;
- Chemical odors are detected by the wearer, or
- Dispose of chemical respirators after a minimum of seven days of use, sooner if necessary.

Containers will be provided for the disposal of PPE used in the EZ and will be located adjacent to the CRZ. Procedures for the use and disposal of PPE are given in SOP FO.6 -Handling of PPE, and shall be strictly followed.

7.0 DECONTAMINATION

7.1 INTRODUCTION

The objective of decontamination is to remove hazardous substances from workers and equipment, to assure compliance with DOE Order 5480.11 and OSHA Standard 29 CFR 1910.120, to prevent the spread of contamination from the site, and to prevent potential adverse health effects that could be caused by contact with hazardous materials by unprotected workers.

Safe work practices and engineering controls should be undertaken to prevent equipment and personnel from becoming contaminated during the work on this site. All equipment, samples, personnel, and vehicles leaving the exclusion zone will be checked for radiological contamination, and effective appropriate decontamination procedures will be undertaken to remove any contamination prior to release of the equipment from the site.

The decontamination of personnel and equipment will be performed in the contamination reduction zone at the exit to the exclusion zone. Protective equipment and respirators will be removed in this area. Containers will be provided for collection of disposable protective clothing.

7.2 DECONTAMINATION PROCEDURES

7.2.1 Personnel and Small Equipment Decontamination

The hazardous materials known to be present at the site are radionuclides. It is the responsibility of the SSO to determine whether radiological contamination of personnel or equipment exists and to prescribe the decontamination procedures that will be required. Appropriate PPE will be used during decontamination operations as an additional measure to prevent direct employee exposure to hazardous substances.

Current EG&G SOPs should be consulted for specific decontamination requirements. These procedures include SOP FO.03 - General Equipment Decontamination; SOP FO.06 - Handling of PPE.

Respirators will be frisked and smeared for contamination prior to removal and cleaning. If radiological contamination is discovered on the exterior of the respirator, it should be removed before washing or disinfecting the face piece. (Head should also be frisked if respirator is found to be contaminated.) Respirators should be wiped clean by site personnel as they are removed. They must be stored in a plastic bag, with the cartridge side down, so that distortion of the facepiece does not occur.

7.2.2 Surface Contamination Surveys

The purpose of the surface contamination surveys will be to control and document all property/material to be released from the RCA. All equipment which leaves the RCA must be surveyed and comply with the EG&G Property Release Evaluation form. Radiological screening will be performed by the project SSO or by project personnel trained in performing this function.

8.0 MEDICAL SURVEILLANCE

8.1 MEDICAL MONITORING REQUIREMENTS

All field personnel and all subcontractors participating in the soil sampling of interstitial waters shall adhere to a medical monitoring program which fulfills the requirements of 29 CFR 1910.120. The program includes:

- Baseline Medical Examination Including Bioassay for Radionuclides
- Annual Medical Examination
- Exit Medical Examination
- Incident Specific Examination

8.2 AVAILABILITY OF MEDICAL SERVICE

The EG&G Occupational Health Department is located in Building 122. The full staff is on duty from 7:30 am to 4:00 p.m. Monday through Friday. The registered nursing staff is on duty from 6:30 a.m. on Monday through 10:00 p.m. on Friday except 11:00 p.m. to 6:30 a.m. (midnight shift). A physician and a nurse are always on call for any emergency during off hours. Weekend coverage (Friday from 10:00 p.m. through Monday at 6:30 a.m. and midnight shift coverage) is provided by emergency medical technicians. They can be contacted at extension 4336 and will meet employees in the Occupational Health Department or respond to the site of any emergency. For life threatening emergencies, call extension 2911.

8.3 TRANSPORTATION FOR MEDICAL REASONS

EG&G and EG&G-subcontractors employees will be provided transportation for medical reasons (if it is medically safe, as determined by the EG&G Occupational Health Staff) to their home or to an appropriate medical facility for the following:

- An emergency: EG&G Occupational Health will determine the appropriate mode of transportation for illness/injury requiring air or ground ambulance transport.
- A non-emergency: If there is no medical necessity for ambulance transport, supervisors will be asked to arrange transportation.

In a situation where an employee is injured and requires non-ambulance transport to an off-site medical facility, the SSO will accompany that person and be available to interface with outside authorities (if necessary) and to provide further transportation for the employee as appropriate. If personnel are unable to arrange transportation on weekends or during night work they will contact the EG&G Shift Superintendent (RFP Emergency Coordinator) at extension 2914 for assistance.

8.4 MEDICAL RECORDS

EG&G and EG&G-subcontractors are required to keep medical information of an individual's file, including laboratory reports, electrocardiogram reports, x-ray reports, health histories, physical examinations, letters, and reports from the employee's personal or referral physician.

The medical records of all field personnel will remain in the possession of their corporate headquarters and will not be taken from the premises except for the purpose of answering subpoenas.

If respiratory protection is required at the site, the physician must provide authorization that the employee is medically qualified to wear a respirator and this record will be kept at the project trailer by the SSO. EG&G and EG&G-subcontractor personnel required to wear a respirator will be fit tested annually.

9.0 RADIOLOGICAL SCREENING PROGRAM

9.1 DIRECT-READING INSTRUMENTS

Direct-reading or real-time monitoring instruments provide instantaneous data on the concentration or identity of radiological contaminants present on the site.

The following direct reading instruments will be used during this project (Also See Table 9.1-1):

- A Bicron Frisk-Tech with A-100 probe will be used to monitor dry equipment surfaces and dry PPE for the presence of alpha-emitting radioisotopes.
- A Ludlum 12 with a 44-9 pancake probe will be used to monitor equipment and PPE for the presence of beta- and gamma-emitting radioisotopes.
- Bicron Frisk-Tech with B-50 (optional).

Table 9.1-1 Direct-Reading Action Limits

Instrument	Monitoring Guidelines	Instrument Reading	Mandatory Action
Bicron Frisk-Tech with A-100 Probe	Survey All Personnel and Equipment Leaving EZ	0 – 100 CPM	No special precautions.
		> 100 CPM	The material is considered contaminated and cannot be released from the EZ; contact SSO.

9.2 REAL-TIME RADILOGICAL MONITORING

Radiological monitoring involves the detection and measurement of alpha, beta, gamma, or neutron radiation. Radiological monitoring is established in accordance with appropriate and relevant requirements and policies. The goal of the radiation monitoring program is to maintain personnel exposure ALARA. Personnel and equipment contamination surveys will be performed in accordance with the appropriate EMRGs or ROIs.

Monitoring of personnel and equipment for radiological contamination will be performed in the following situations:

- Whenever leaving a RCA;
- Whenever exiting a contaminated area;
- During and after work where the potential exists for release of radioactive material;
- Whenever passing through an RCA;
- Following personnel decontamination;
- When required by EG&G SOPs;
- When required by a RWP; or
- When required by the EG&G HSPM, Section 18.10 "Release of Property for Conditional and Unrestricted Use".

9.3 PERSONNEL RADIATION MONITORING

All field personnel on this project will be involved in the RFP personnel radiation dosimetry program during site activities. The program entails the use of personal radiation dosimeters coupled with laboratory analyses to determine the radiation doses experienced on the site. Badges will be provided to each worker and turned into the dosimetry office at specified frequencies. EG&G will be responsible for providing thermoluminescent dosimeters, analyses of dosimeters, and reporting the results to the site SSO. Results will be given to employees, kept in health and safety files, and maintained by each contractor.

10.0 TRAINING

All EG&G & EG&G-subcontractor personnel assigned to the SSP must complete the training required by OSHA as well as site-specific health and safety training courses required by EG&G (See Table 10-1). The soil sampling of interstitial waters is an environmental investigation classified as a hazardous waste operation by OSHA standard 29 CFR 1910.120; therefore, the training requirements, including the initial training, annual refresher training, and supervisor training, apply to EG&G & EG&G-subcontractor personnel working at the site. Additional training courses required by EG&G include General Employee Training, radiation worker, and respirator training.

10.1 TRAINING REQUIREMENTS

10.1.1 Hazardous Waste Site Health and Safety

Any EG&G or EG&G-subcontractor employee assigned to work on the SSP must complete the 40 hour hazardous waste health and safety course required by OSHA in 29 CFR 1910.120(e). The 40-hour course and 3 days of supervised field experience is mandatory for workers who may be required to use respiratory protection equipment and/or who are engaged in activities in which they may be exposed to hazardous substances and health hazards at or above the permissible exposure limits.

All hazardous waste workers must complete an annual 8-hour refresher course. The course content consists of a summary of the 40-hour course. Supervisors of hazardous waste sites or of tasks conducted on hazardous waste sites must complete an additional 8-hour supervisor health and safety training course. A summary of training requirements is given in Table 10.1.

Table 10-1 1910.120 Training Requirements for SSP

Operation/Personnel	Site Safety Briefing	24-Hour	40-Hour	8-Hour Supervisor	8-Hour Refresher
Routine or Occasional Site Worker	Yes	Yes [3]	Yes	N/A	Yes
Routine or Occasional Site Worker (Support Zone)	Yes	N/A	N/A	N/A	N/A
Onsite Supervisor	Yes	Yes [4]	Yes	Yes	Yes
Visitor [1,2] • Level A or B PPE	Yes	N/A	Yes	N/A	Yes
• Level C PPE	Yes	Yes	N/A	N/A	Yes
• Level D or No PPE	Yes	N/A	N/A	N/A	N/A

[1] All visitors should be issued and instructed in the use of required PPE, receive a site-specific safety briefing, and be escorted by training personnel.

[2] Visitors are not directly involved with hazardous waste operations (i.e., management, audit, and oversight personnel). Visitors include those covered and not covered by OSHA.

[3] 24-hour training is adequate for these workers only for entry into areas where Level D PPE is sufficient. For routine workers, the area must also have been monitored and fully characterized.

[4] Supervisors of general site workers who require only the 24-hour course need only take the 24-hour initial and 8-hour supervisor courses.

10.1.2 Radiation Worker Training

All subcontractor personnel performing field work must complete the 1-day class entitled "Radiation Safety for Environmental Restoration" offered by the EG&G Performance Based Training Department. Starting January 1, 1994 all site personnel must either test out or complete a 3 day EG&G Radiation Worker Level II Training Course.

10.1.3 Site-Specific Briefing

All subcontractor employees assigned to work on the SSP project must receive a briefing that introduces site safety, emergency procedures and the information contained in the plan. The briefing should provide enough detail that employees can implement the plan and safely perform their assigned tasks.

Visitors who do not have the required OSHA training and medical certifications will not be allowed to enter the site EZ or CRZ. Prior to gaining access to the site, visitors to the SSP site will have an orientation that summarizes the plan. This orientation does not qualify the visitor to access-controlled areas of the site. The purpose of the briefing is to provide sufficient information on the hazards and control measures at the site to prevent the visitor from unknowingly violating any site control measures. Visitors will be escorted by a trained site employee during the entire visit.

Visitors will provide signature verification that they have read, understand, and will comply with the requirements of the plan. Signatures are recorded in a logbook, which is maintained at the project trailer by the SSO.

10.1.4 Safety Meetings

Discussion at weekly meetings may include the following topics:

- Health and safety considerations and the required PPE for current operations;
- Any revisions to the plan;
- Any new MSDS filed at the project trailers;
- Documented or observed unsafe acts committed at the worksite, a clarification of the safety requirements violated, and methods to prevent future violations; and
- Approved changes to the plan.

Workers are required to attend the weekly safety meetings and sign a roster (attendance sheet) that will be maintained by the SSO at the project trailers. Meeting minutes will be documented and attached to the roster. The project manager or HSO will review the meeting minutes with absentees and have them sign the attendance sheet. This documentation will be filed at the work site,

available to EG&G upon request, and archived when the project is completed. Safety meetings will be conducted weekly at a minimum or more frequently as necessary.

10.1.5 Rehearsal of Emergency Response Plan

Subcontractor personnel will participate in any Emergency Response Plan rehearsals conducted by EG&G Emergency Preparedness.

10.2 VERIFICATION OF TRAINING

The SSO will maintain documentation of EG&G and EG&G-subcontractor employee training (including supervised field experience) on file at the project trailers. These records will be kept on file by the SSO.

11.0 EMERGENCY INFORMATION

11.1 NOTIFICATION

LIFE-THREATENING EMERGENCIES
CALL EXTENSION 2911

NON LIFE-THREATENING EMERGENCIES
CALL EXTENSION 2914

Notification requirements for emergency situations at SSP depend on the nature of the perceived emergency (e.g., spill injury, illness, fire) and the extent to which the damage and/or injuries have progressed. Upon discovery of a release of materials or other non life-threatening emergency situation, the Shift Superintendent will be notified at extension 2914. If there is no answer at 2914, refer to 2911. If the situation is life-threatening, RFP emergency response personnel will be notified as detailed below.

Call Extension 2911 to obtain emergency assistance for life-threatening emergencies and to simultaneously access the following:

- Emergency Coordinator (EC), Shift Superintendent
- Plant Protection Central Alarm Station
- Fire Department Dispatch Center
- Medical Department

As much detail about the emergency as possible will be provided. A decision to dispatch any or all of the following equipment will be based on the provided information:

- Fire Engine
- Ambulance
- Hazardous Material (HAZMAT) Response Vehicle

Provide the following information, upon request, to the Emergency Dispatcher:

- Informant's Name
- Exact Location of the emergency
- Nature of the emergency
- Condition of the patient if applicable (breathing, consciousness, bleeding, etc.)
- Special hazards in the area
- Any other information requested

If no details are given, emergency response personnel will respond automatically.

The EC will immediately respond to emergencies. The RFP Protection Central Alarm Station will activate the Building Emergency Support Team by the Life Support/Plant Warning Public Address System. The EC will activate the Emergency Operation Center and notify departments that have an advisory role in the situation, if applicable. The EC will determine whether additional help from off-site agencies (e.g., police, hospitals) is required.

The EC will also notify the following groups when appropriate:

- Radiological Engineering
- Industrial Hygiene
- Industrial Safety
- Waste Operations
- Waste Programs

- Traffic
- Occurrence Notification Officer
- Health and Safety Administrator

11.2 SPECIFIC SITE HAZARDS

The response to and abatement of most emergency situations from the SSP will require the expertise of RFP emergency response personnel. Situations that will require the assistance of RFP emergency responders include, but are not limited to the following:

- Accidents resulting in physical injury;
- Accidents resulting in radiological exposure;
- Incidents where the substance cannot be absorbed, neutralized or otherwise controlled at the time of release;
- Situations where there is a potential for safety or health hazards
- Accidents resulting in a radiological exposure exceeding the following limits:
  - 2 rem (Whole Body)
  - 7.5 rem (Skin)
  - 15 rem (Extremities)

11.3 SPILLS OF HAZARDOUS AND RADIOACTIVE MIXED WASTE AND HAZARDOUS MATERIAL

REPORT TO THE EC AT EXTENSION 2911 all spills where the substance cannot be absorbed, neutralized, or otherwise controlled at the time of release, or where there is a potential for safety or health hazards (fire, explosion, chemical, or radiological exposure). The EC will dispatch the HAZMAT Response Vehicle and any other necessary support personnel.

Spills that do not require a HAZMAT response shall be cleaned up by site personnel according to an approved EG&G SOP. Spills onto porous ground will require removal of contaminated dirt as

well as the spilled material and are expected to be classified as hazardous and radioactive mixed waste.

11.4 POST-EMERGENCY RESPONSE EQUIPMENT MAINTENANCE

Equipment used in emergency situations will be decontaminated by wiping with a soap solution. Rags used for decontamination will be disposed as low-level radioactive waste, if necessary. Contaminated heavy equipment used in emergencies will be thoroughly decontaminated prior to being released from the site. The decontamination protocols described in SOPs FO.10 - Heavy Equipment Decontamination, FO.11 - Handling of Decontamination Water and Wash Water, and FO.18 - Decontamination Facility Operations will be followed. Equipment will not be released until monitoring indicates that contaminant levels are less than 20 disintegrations per minute/100 square centimeters (above background) and that chemical contamination is not present.

11.5 EMERGENCY EQUIPMENT LOCATION

A 15-minute emergency eye wash and shower will be provided for tasks where eye hazards may exist. Either a 15-minute eye wash will be located within 100 feet or 10 seconds of travel time from each hazard area or a portable hand-held eyewash bottle will be available at the site for use. These items may be located in the project trailers on the site. Fire extinguishers will be located in all field vehicles and will be temporarily located at sites where there is a potential for fires (e.g., during welding operations). First aid will be provided by EG&G Emergency Medical Technicians.

11.6 EVACUATION PLAN

Personnel and visitors to SSP will evacuate the area if any of the following occur:

- If an emergency (such as a fire or chemical spill) develops.
- If instructed by site supervision.
- If instructed by the Shift Superintendent over the site radio or telephone system.

After an evacuation, each Field Team Leader will verify that the employees that he/she supervises are accounted for.

11.7 COMMUNICATION

Radios will be used by field personnel to maintain contact with the project manager or other designated persons in the trailers who have access to telephones. The HSO and PM will monitor the radio frequency in use by field personnel at all times during field operations. Radio frequencies are monitored by the RFP security system to ensure that response time is minimal in the event of an accident or emergency on the site. In the event of a plant emergency, Central Dispatch will notify the trailers and field personnel by telephone and radio. If Central Dispatch fails in its attempt to contact anyone on-site, a security car will be sent to the site to alert personnel of the emergency.

12.0 REFERENCES

EG&G. 1991. *Environmental Management Radiological Guidelines.*

EG&G. 1993. *Final Site-Specific HSP for the Phase I RCRA Facility Investigation/ Remedial Investigation OU2.*

EG&G. 1993. *Request for Competitive Proposal - Task Order #MTS 343788DB3 - DMM-235-93 "SSP at RFP".*

Health and Safety Plan (HASP) Addendum

Cleanout and Decontamination of Wooden Shed

(Addendum to "Supplement to Site-Specific Safety and Health Plan, Operable Unit No.2, Surficial Soil Program)

Prepared by: John W. Gregg / [signature] / Site Safety Officer, Surficial Soils Program / 03/16/94 /
Name Signature Title Date

Introduction

This HASP addendum covers activities to be performed during the cleaning, decontamination, and interior painting of the wooden shed currently located approximately ten feet east of the eastern boundary of the OU2 Americium Zone area used by the Surficial Soil Program. All activities described in this HASP addendum will be conducted in accordance with this addendum, and with the Supplement to Site-Specific Safety and Health Plan, Operable Unit No.2, Surficial Soil Program.

Objective

The shed is to be cleaned and painted, prior to it being utilized as a storage shed for Soil Science Program equipment and supplies. This will involve removal of insulation, removal of rodent droppings and nests, and interior decontamination of the structure. It is intended to perform these activities between 3/17/94 - 3/25/94.

Hazard Assesment

Biological

Various biological hazards may be present in the shed due to the presence of rodent droppings and dried rodent urine in the shed. Hantavirus, otherwise known as "Four Corners Virus", is a primary concern. Hantavirus is an infectious disease transmitted primarily by the droppings and/or dried urine of infected rodents. Human infection can occur by inhalation of aerosols of these materials, by direct contact with these materials in eyes, other mucous membranes or broken skin, or by ingestion. Infected humans initially exhibit flu-like symptoms. The disease can progress quickly, however,and possibly lead to respiratory failure and death.

Chemical

Vapors will be generated by the spraying of decontamination solution (solution of household bleach and water) and paint on the interior walls of the shed.

Physical

Heat Stress preventative gudelines detailed in "Supplement to Site-Specific Safety and Health Plan, Operable Unit No. 2, Surficial Soils Program" will be followed. Poor visibility will result from use of full face respirators. Work will be planned in advance prior to donning respirators and personnel will maintain verbal communication ability at all times. If hand-tools are required, only manually-operated or battery-powered hand tools will be used. One team member will maintain "firewatch" on the gasoline-engine pressure sprayer while it is in use.

Tasks

The following steps are expected to be performed, in the order in which they are presented.

1. Spray down of all interior walls, shelving and wooden cabinet with a disenfectant solution (nine parts water mixed with one part household bleach).
2. Removal of shelving from interior walls.
3. Removal of wooden cabinet from interior wall.
4. Removal of all insulation from interior walls.
5. Sweeping/shoveling rodent droppings and nesting materials.

If after the above steps are performed, the shed appears to be in a conditon suitable for use, the remaining steps will be performed:

6. Replace shelves and cabinet.
7. Spray painting of all interior surfaces, shelving and wooden cabinet.
8. Caulking or other minor repair of holes through which rodents may attempt re-entry into the shed.

Personal Protective Equipment (PPE)

Due to the possibility of encountering Hantavirus, as well as due to the vapors that will be generated by the spraying of the structure, Level C PPE will be worn by all personnel working within the shed. Level C PPE will consist of the following:

1. Full face twin cartridge respirators (MSA).
2. Cartridges appropriate to the task. MSA GMC-H cartridges (organic vapor, acid gas, HEPA) will be worn during the removal of insulation and droppings, and during spraying of the disenfectant solution and paint. GMC-H cartridges provide protection against chlorine vapors.
3. DOE coveralls and underwear.
4. PVC steel toed boots.
5. Yellow poly-coated tyvek with hood.
6. Nitrile inner surgical gloves.
7. Nitrile/latex outer gloves (disposable leather gloves will be worn over outer nitrile/latex gloves if handling sharp or heavy materials is required).

8. Wrist and ankle seams, as well as the facepiece to tyvek hood seam, will be sealed with duct tape.

Note: Cartridges will be replaced daily, at a minimum, or immediately if "loading" or "breakthrough" is detected.

Decontamination

-Equipment / Trash

1. All tools used within the structure will be thoroughly sprayed with the same disinfectant solution used to spray the interior walls. The tools will then be washed in a liquinox/water solution and then rinsed in plain water.
2. Insulation and rodent droppings will be placed in clear plastic trash bags and sprayed with the disenfectant solution prior to sealing the bags.

-Personnel

1. Prior to removal of PPE, personnel will spray each others PPE with disenfectant solution, taking care not to spray directly onto respirators.
2. Respirators will be hand wiped with disenfectant solution -soaked paper towels prior to removal. The respirators will then be sprayed with water to prevent degredation of the facepiece material.
3. Personnel will remove PPE in the following order:
   - duct tape from all seams
   - outer gloves
   - tyvek coveralls
   - respirator
   - PVC boots
   - surgical gloves
4. Respirators will be cleaned in MSA cleaner - sanitizer and rinsed in clean water before re-donning. Used PPE will be placed and sealed in clear plastic trash bags. It is anticipated that PPE generated during these activities will not be radioactively contaminated.
5. Personnel will wash hands and face prior to drinking water. No consumables other than water will be allowed or provided in the Support Area. Personnel will discard DOE - issue clothing and shower in the contactors' yard shower trailer prior to utilizing contactors yard toilet facilities, returning to the site trailer or to leaving RFP.

Manpower

It is anticipated that two persons (John Gregg - IT Corp., Steve Aldridge - S.M. Stoller Corp.) will require two days to complete the task.

Equipment / Chemicals

The following equipment will be or may be utilized to accomplish the tasks described above:

1. Small hand tools - hammers, drills, etc.
2. Garden sprayers
3. Household bleach
4. Water
5. Enamel paint
6. Gasoline - engined pressure sprayer
7. Gasoline safety can
8. Fire extinguisher
9. MSA cleaner sanitizer
10. Drinking water, water cooler, paper cups
11. Paper towels, plastic trash bags

MSDSs will be available in the Stoller trailer for all chemicals used on this project.

Approved by: L.A. Velonis, L.A. Velonis, Health & Safety Liaison Of., 3/17/94
Name Signature Title Date

Approved by: J.L. Anderson for K.D. Anderson, [signature], Env. Restoration Radiological Engineer, 3/17/94
Name Signature Title Date

Approved by: Michael Lehman, Michael Lehman, Safety Scientist, 03/18/94
Name Signature Title Date

Steven W. Aldridge 4-22-94

4-22-94

Health and Safety Plan (HASP) Addendum #2
PLANNED INTRUSIVE ACTIVITIES DURING SPRING - SUMMER, 1994
and CHANGE IN PERSONAL PROTECTIVE EQUIPMENT
(Addendum to "Supplement to Site-Specific Safety and Health Plan, Operable Unit No.2, Surficial Soil Program)

Prepared by: John W. Gregg / [signature] / Site Safety Officer, Surficial Soils Program / 05/03/94 /
Name Signature Title Date

Introduction

This HASP addendum covers planned intrusive activities to be performed during the Spring and Summer, 1994, in the OU2 Americium Zone area under investigation by the Soil Science Program. This addendum also covers a proposed change in Personal Protective Equipment permitted for use in the investigation area. All activities described in this addendum will be performed by or at the direction of Soil Science Program personnel. All activities described in this addendum will be conducted in accordance with this and other approved addendums, and with the Supplement to Site-Specific Safety and Health Plan, Operable Unit No.2, Surficial Soil Program.

Change in Personal Protective Equipment (PPE)

Upon final approval of a revised version of Field Operating Procedure F.O.6 (Handling of Personal Protective Equipment), DOE-issue white cotton coveralls as an outer protective garment will be approved for wear in the investigation area. DOE-issue surgical scrubs will be approved for wear as a precautionary garment to be worn under the white cotton coveralls when in the investigation area, and as an outer garment when in non-RCA areas. The white cotton coveralls will replace white uncoated tyvek, and the surgical scrubs will replace DOE-issue grey coveralls. All other PPE as described in the Supplement to Site-Specific Safety and Health Plan will remain unchanged. If DOE-issue white coveralls or surgical scrubs are unavailable, if site conditions require, and until the revision to F.O.6 is approved, PPE as described in the Supplement to Site-Specific Safety and Health Plan will be worn.

Description of Planned Intrusive Activities

1. A pickup-truck mounted hydraulic soil coring rig will be driven into the Americium Zone. The rig will remove soil cores approximately four inches in diameter and approximately fifteen inches long. Instruments will be placed at the bottom of each hole and the soil core will be placed into the original hole. Between four to ten cores will be removed and replaced.

2. Hand digging of one or two holes, each approximately five to ten feet in diameter by two feet deep. A soil core "plug" will be removed from the center of one hole, instruments placed at the bottom of the hole, and the soil plug will be replaced. Remaining excavated soils will be hand backfilled into the original hole. The second hole will be required if a counterweight system is required to suspend the soil plug. It is currently planned however to suspend the soil plug using a tripod and winch system during the intrument installation.

3. Hand augering and All Terrain Vehicle - mounted power augering of between forty to one hundred - one inch diameter holes for piezometer, tension sampler and tensiometer installation. Depths will range from four inches to twelve feet.

4. Hand driving a metal stake approximately twenty centimeters deep to create a hole for instrument probe insertion. Approximately one hundred holes will be driven in a grid pattern over the entire Soil Science Program work area.

Note: It is not anticipated that the intrusive activities described above will result in the generation of waste materials.

Hazard Assesment

Wildlife

No wildlife hazards in addition to those addressed in the Supplement to Site-Specific Safety and Health Plan are anticipated as a result of the planned intrusive activities.

Chemical

No chemical hazards in addition to those addressed in the Supplement to Site-Specific Safety and Health Plan are anticipated as a result of the planned intrusive activities.

Physical

Heat Stress preventative gudelines detailed in "Supplement to Site-Specific Safety and Health Plan, Operable Unit No. 2, Surficial Soils Program" will be followed. All gasoline powered equipment will be equipped with a fire extinguisher. Operation of gasoline powered intrusive equipment will require at least two persons in attendance, one of whom will be assigned as "firewatch". Personnel will be cautioned to be aware of and stay clear of moving machinery. Wheels of

vehicles driven into the investigation area will be chocked and the emergency/parking brake (if present) will be engaged. Powered equipment will be inspected by Occupational Safety prior to being utilized on plantsite. Intended work sites will be investigated for the presence of overhead and underground utility lines prior to the commencement of intrusive activities.

Radiological

It is anticipated that the planned intrusive activities will result in little to no dust emissions. Any soils brought to the surface will be wetted with a portable pump sprayer to minimize dust emissions. Emission of visible dust that is not immediately controllable by wetting the area will result in a halting of activities and re-evaluation of procedures. Need for use of airborne particulate monitoring instrumentation is not anticipated.

Personal Protective Equipment (PPE)

It is anticipated that the PPE described above will be sufficient to perform the planned intrusive activities, as well as all other planned site activites described in the Supplement to Site Specific Safety and Health Plan. Upgrade of PPE, if necessary, will be performed at the direction of the Site Safety Officer (examples: when or if wetting soils to prevent fugitive dust emissions results in excessively muddy conditions; if handling of chemicals requires greater protection than that provided by coveralls or uncoated tyvek). Use of respirators (level C PPE) is not anticipated. If conditions requiring upgrade to level C are encountered, activities will be halted and procedures will be re-evaluated.

Radiological Contamination Monitoring / Decontamination

-Equipment

Equipment performing intrusive activities will be decontaminated to the extent possible within the work area (brushing off loose dirt, soap/water brush, water rinse). Radiological contamination monitoring will then be performed for total fixed plus removable and removable alpha and beta/gamma contamination. If contamination levels are below the allowable limits for unrestricted release, the equipment may then be released to the project trailer by the Health and Safety Specialist (HSS). Large equipment requiring unrestricted release off plantsite will first be decontaminated and surveyed as described above, and if contamination levels permit, will then be transported to the Main Decontamination Facility for precautionary decontamination and further monitoring. Equipment leaving the OU2 Americium Zone for release off plantsite and / or equipment with complex surfaces leaving the Americium Zone will require notification of and approval by Radiological Engineering prior to removal from the Americium Zone and from plantsite.

-Personnel

Personnel monitoring and decontamination procedures as described in the Supplement to Site-Specific Safety and Health Plan remain in effect.

	Name	Signature	Title	Date
Approved by:	Michael Lee	Michael Lee	Sad Scientist	6-9-94
Approved by:	KD Anderson		ERHSD	6-10-94
Approved by:	RC Gentry		Health Physicist	6.13.94
Approved by:	LA Nelson		HSLO	6-13-94
Approved by:				

I have read the contents of this Hasp addendum and agree to comply with the requirements stated within.

John Gregg 6/14/94

Dale Anderson Dale Anderson 6/14/94

G. BARTIT 6/14/94

8.15.94

(additional signatures on reverse side):

United States Government

Memorandum

Department of Energy
Rocky Flats Field Office

DATE: JUN 15 1994

REPLY TO ATTN OF: ER:DJ:06689

TO: Sue G. Stiger, Associate General Manager
Environmental Restoration Management
EG&G Rocky Flats, Inc.

The Department of Energy Rocky Flats Field Office Acting Assistant Manager for Environmental Restoration (AMER) has reviewed your request for interim use approval of Procedure FO.06, "Handling Personal Protection Equipment. The AMER hereby grants limited interim approval for use, with the following stipulations:

- Interim use only applies to the use of cloth coveralls in lieu of Tyvek for the purpose of reducing the possibility of heat related stress in personnel;
- The use of cloth coveralls in lieu of Tyvek is approved by appropriate Health and Safety groups; and
- Only coveralls screened as uncontaminated shall be permitted to go to the laundry. Any contaminated coveralls shall be handled as hazardous/radioactive/mixed waste per the current version of FO.06 (Rev. 2, March 1, 1992).

Jessie Roberson
Acting Assistant Manager for
Environmental Restoration

cc:
D. Joseffy, NFT
K. Bentzen, EG&G

ROCKY FLATS
SOIL DISTURBANCE APPROVAL FORM

LOCATION/PROJECT TITLE/WORK DESCRIPTION
SURFICIAL SOIL PROGRAM

CONTRACTOR: STOLLER AUTH./CHARGE NO.: 986607

LOG NO: 62-7-18-91 DRAWING NO.:

CAUTIONS/SPECIAL INSTRUCTIONS:

DISTURBANCE LIMITS (DURATION/BOUNDARY): 8-14-94

RESPONSIBLE JOB SUPERVISOR: [illegible signature]

OPERATOR/WORKER(S): [illegible signatures]

EXCAVATION SPECIALIST: [illegible signature] DATE: 6/14/94

EXCAVATION ENTRY APPROVAL

OSHA SOIL CLASS: A ☐ B ☐ C ☐

INITIAL SAFETY INSPECTION: BY: DATE:

DAILY INSPECTIONS:

INITIALS	DATE	INITIALS	DATE	INITIALS	DATE

Health and Safety Plan (HASP) Addendum #3

Change in Personal Protective Equipment (PPE)

(Addendum to "Supplement to Site-Specific Safety and Health Plan, Operable Unit No.2, Surficial Soil Program)

Prepared by: John W. Gregg / [signature] / Site Safety Officer, Surficial Soils Program / 05/13/94 /
Name Signature Title Date

Soil Science Program personnel entering the OU2 Americium Zone will have available reusable PVC steel toe boots to wear as an alternate to yellow latex "nuke boots". The PVC boots will be frisked for alpha and beta contamination prior to personnel exiting the Americium Zone. If no contamination is found, the boots will be placed upside down in a wooden boot rack for re-use the following work day. If contamination is found, the boots will be decontaminated or disposed of. Contaminated boots will not be re-used. Use of reusable boots should present no added risk of radiological exposure to personnel as compared to "nuke boots", and will result in a significant cost savings to the project.
Yellow latex "nuke boots" will remain available for wear by project personnel, if necessary.

Approved by: R C GENTRY / [signature] / Health Physicist / 5/13/94
Name Signature Title Date

Approved by: L A. Nelson / [signature] / H+S Liaison Officer / 5/16/94
Name Signature Title Date

Approved by: K.D. Anderson / [signature] / ERHSD / 6/9/94
Name Signature Title Date

Michael Litka Michael Litka Soil Scientist 05/20/94

EG&G HASP FIELD CHANGE FORM

Field Change Number: OU 2 SS/SNP-94-001 Effective Date: 07/11/94

Requested by: K. D. Anderson (Print Name) Signature/Date

Pen and Ink changes to be made to the HASP to alert the reader of this change:

Change #1: Due to additional tasks being conducted under the OU 2 Surficial Soil Program, the tasks identified below must be included in Section 1.4 of the Supplement to Site-Specific Safety and Health Plan, Operable Unit No. 2, Surficial Soil Program.

Reason for the change to be incorporated into the HASP:

Any additional tasks must be identified in a project's health and safety plan. Therefore, tasks for the Evapotranspiration Rates in the Rocky Flats OU 2 Zone must be identified in the Supplement to Site-Specific Safety and Health Plan, Operable Unit No. 2, Surficial Soil Program.

Text of change to be incorporated:

Section 1.4, Second Paragraph, First Sentence, change: "The six tasks..." to "The eleven tasks..." at the beginning of the sentence.

Section 1.4, Second Paragraph, First Sentence, change: ";" to ":" at the end of the sentence.

Section 1.4, Second Paragraph, After Sixth Bullet, add the following bullets to the paragraph; that is, add:

- conduct evapotranspiration studies
- installation and support of a Class-A evaporation pan and various weather instruments
- measure weather data and evapotranspiration rates
- monitor and record weather evapotranspiration data
- conduct intrusive work to include soil excavation

APPROVALS:

7/7/94
ERHSO/Date M.D. Shoemaker for

7-7-94
H&S Liaison Officer/Date

7/7/94
Unit Manager/Date

AS NEEDED CONCURRENCE:

7/8/94
Occupational Safety

7/7/94
Radiological Engineering

7-7-94
Industrial Hygiene

N/A
Occupational Health

N/A
Fire Department

N/A
Radiological Operations

Health and Safety Plan (HASP) Addendum #4

PLANNED INTRUSIVE ACTIVITY, SUMMER - FALL, 1994

(Addendum to "Supplement to Site-Specific Safety and Health Plan, Operable Unit No.2, Surficial Soil Program)

Prepared by: John W. Gregg / [signature] / Site Safety Officer, Surficial Soils Program / 08/29/94 /
Name Signature Title Date

Introduction

This HASP addendum modifies a planned intrusive activity to be performed during the Summer and Fall of 1994 in the OU2 Americium Zone area under investigation by the Soil Science Program. This activity, described in HASP addendum #2 (see attached) as " hand digging of one or two holes, each approximately five to ten feet in diameter by two feet deep" has been changed. All activities described in this addendum will be performed by or at the direction of Soil Science Program personnel. All activities described in this addendum will be conducted in accordance with this and other approved addendums, and with the Supplement to Site-Specific Safety and Health Plan, Operable Unit No.2, Surficial Soil Program.

Description of Planned Intrusive Activity

1. Excavation of two holes, each approximately six feet by six feet square, by three and one half feet deep. The bulk of the excavation will be performed with a small rubber tired backhoe. Minor excavation will be performed manually with a pick and shovel in order to prepare each excavation for placement of instrumentation. A "core" of soil, thirty eight inches in diameter, will initially be left undisturbed at the center of each excavation. Excavated soil will be placed to the side of each excavation on plastic sheeting.
2. The center soil "cores" will be separated from the underlying soil by insertion of a metal plate horizontally through the cores at the bottom of each excavation. It is anticipated that the metal plates will be driven through the cores using a hydraulic jack. The soil cores will then be lifted from the ecavations by the backhoe. It is intended to attach heavy cargo straps from the metal plates at the bottom of the cores to the backhoe bucket. The soil cores will be temporarily placed to the side of each excavation.
3. Concrete will be hand mixed and poured into the center of each excavation, forming slabs approximately forty inches in diameter by four inches thick. Lysimeter instrumentation will then be placed in the excavations atop each slab, and the soil cores will be lifted by the backhoe into place on top of the instrumentation. Excavated soils will then be backfilled into the remaining areas of the excavations.

Hazard Assesment

It is anticipated that the hazards related to intrusive activities as described in HASP addendum #2 will be applicable to this task. HASP addendum # 2 will be used in conjunction with this addendum.

Additional Physical Hazards

It is anticipated that the only hazards specific to this task not previously discussed in the HASP or the HASP addendums are physical hazards related to the backhoe and excavations. The following steps will be taken to ensure worker safety:

1. The backhoe will be operated by a selected Soil Science Program staff member with previous experience operating backhoes and other heavy equipment on construction sites.
2. The backhoe will be inspected by EG&G Occupational Safety prior to being utilized on plantsite.
3. When being driven on paved roads on plantsite, the backhoe will be escorted by a project vehicle with blinkers flashing.
4. All movement of the backhoe within the Americium Zone will be performed under the direct supervision of the Site Safety Officer, with the approval of the EG&G Project Manager.
5. All backhoe excavation activities will be performed under the direction of the Principle Investigator for this activity, and under the supervision of the Site Safety Officer.
6. At no time will personnel be allowed to approach the backhoe from a direction unseen by the operator.
7. Sides of the excavations will be sloped to prevent collapse of material into the excavations, and excavated materials will be deposited at least two feet from the sides of each excavation.
8. Only limited amounts of concrete will be mixed. The need for respirators to protect against breathing concrete mix particulates is not likely. However, personnel mixing concrete as well as personnel in the immediate vicinity will be respirator fit tested and respirators will be available in the field if required.

Radiological Contamination Monitoring / Decontamination

The provisions described in Hasp addendum #2 are applicable and remain in effect for this activity.

Approved by: W.D. HARLOW / W.D. Harlow / Safety Eng: IH&S / 9-12-94 /
Name Signature Title Date

Approved by: RC GEOTAY / RC Geotay / Health Physicist IV / 9.13.94 /
Name Signature Title Date

Approved by: MD Schuckengast for KD Anderson / MD Schuckengast for KD Anderson / ER HSO / 9-13-94 /
Name Signature Title Date

Approved by: H.M. DANIELS for M.Z. LITAOR / H.M. Daniels for M.Z. Litaor / SOIL SCIENCE TEAM LEADER / 9/14/94 /
Name Signature Title Date

BACKHOE WR:

Health and Safety Plan (HASP) Addendum #5

MODIFICATION TO PLANNED INTRUSIVE ACTIVITY, FALL, 1994

(Addendum to "Supplement to Site-Specific Safety and Health Plan, Operable Unit No.2, Surficial Soil Program)

Prepared by:	John W. Gregg	[signature]	Site Safety Officer, Surficial Soils Program	10/14/94	
	Name	Signature	Title	Date	

Introduction

This HASP addendum modifies a planned intrusive activity to be performed during the Fall of 1994 in the OU2 Americium Zone area under investigation by the Soil Science Program. This activity, described in HASP addendum #4 as using cargo straps attached to a backhoe bucket to lift a soil "core" has been changed. All activities described in this addendum will be performed by or at the direction of Soil Science Program personnel. All activities described in this addendum will be conducted in accordance with this and other approved addendums, and with the Supplement to Site-Specific Safety and Health Plan, Operable Unit No.2, Surficial Soil Program.

Description of Intrusive Activity Accomplished To Date

Excavation by hand of one hole, approximately six feet in diameter by by two feet deep. A "core" of soil, approximately three feet in diameter, has been left off-center within the excavation. The center soil "core" has been separated from the underlying soil by utilizing a hydraulic jack to drive steel channels horizontally through soil at the bottom of the core.

Description of Modification to Intended Remaining Activities

It had been intended to attach heavy cargo straps from the steel channels at the bottom of the core to the lifting hook of a backhoe bucket. The backhoe would then have lifted the soil core out of the excavation, placing it temporarily to the side while the interior of the excavation was outfitted with instrumentation. The backhoe would have then placed the soil core back into the excavation, directly on top of the measuring instrumentation. Due to the unavailability of a suitable backhoe and trained operator, the use of a backhoe to accomplish the lifting of the soil core is not possible.

It is now planned to use a forklift with a hoisting attachment to lift the soil core from the excavation. The forklift and trained operator will either be provided by EG&G or its subcontractor, Golder and Associates. The forklift hoisting attachment will either be provided by EG&G or will be obtained through an offsite vendor. The forklift will hoist the soil core with cargo straps attached to the steel channels and hoisting attachment by heavy duty eyelets and clevices. The cargo straps have been rated by the vendor for vertical loads in excess of ten thousand pounds each.

Hazard Assesment

It is anticipated that the hazards related to this activity as described in HASP addendums #2 and #4 will be applicable to this task. HASP addendums # 2 and #4 will be used in conjunction with this addendum.

Additional Physical Hazards

It is anticipated that the only hazards specific to this task not previously discussed in the HASP or the HASP addendums are physical hazards related to the forklift itself. The following steps will be taken to ensure worker safety:

1. The forklift will be operated by a selected EG&G or EG&G subcontactor employee with previous experience operating forklifts.
2. All movement of the forklift within the Americium Zone will be performed under the direct supervision of the Site Safety Officer, with the approval of the EG&G Project Manager.
3. All forklift hoisting activities will be performed under the direction of the Principle Investigator for this activity, and under the supervision of the Site Safety Officer.
4. The Principle Investigator, the Site Safety Officer, and the forklift operator will each inspect the hoisting attachment, the cargo straps, and all eyelet and clevice attachments prior to hoisting the soil core. Each person must give their approval that the core is ready for hoisting prior to commencement of the activity.
5. At no time will personnel be allowed to approach the forklift from a direction unseen by the operator.
6. At no time will personnel be allowed to approach the soil core close enough to be struck by it or the cargo straps while it is being hoisted.

Radiological Contamination Monitoring / Decontamination

The provisions described in Hasp addendum #2 are applicable and remain in effect for this activity.

Approved by:	K C Gentry	[signature]	Health Physicist	12-13-94
	Name	Signature	Title	Date
Approved by:	N. D. Harlow	W D Harlow	ES&H Administrator	12-13-94
	Name	Signature	Title	Date
Approved by:	L.A. LeLievre for MDD	L.A. LeLievre	H+S Liason Officer / Industrial Hygiene	12-13-94
	Name	Signature	Title	Date
Approved by:	K.P. Anderson	[signature]	ERHSO	12/13/94
	Name	Signature	Title	Date
Approved by:	M.C. Litton	[signature]	[illegible]	12/13/94
	Name	Signature	Title	Date

MOD WR

May 19, 1995

Mr. Roland Geronsin
University of Colorado
Health Physics Lab
Campus Box 441
Boulder, CO 80309

Dear Mr. Geronsin,

Attached for you review is the procedure that will be used to prepare and transport samples prior to viewing them in the Geology Building Laboratory. As described in the procedure, a conservative estimate of the likely $^{239/240}$Plutonium and ^{241}Americium activities in each one milliliter sample is 0.023 picocuries and 0.003 picocuries respectively.

This procedure has been reviewed and approved by EG&G Rocky Flats. I believe that you will also find the procedure satisfactory for performing the proposed work. If you have any questions or concerns please call me as soon as possible (966-5790) so that they can be addressed prior to the May 24, 1995 committee meeting.

Sincerely,

Greg Litus

Scientific Notebook
Sample Preparation and Handling Procedure

Project Description

This investigation is part of the ongoing study of the mobility of $^{239/240}$Plutonium (Pu) and ^{241}Americium (Am) in soils near the 903 Pad at the Rocky Flats Environmental Technology Site (Rocky Flats). Preliminary results from previous experiments at the soil study site (Site) show that there is a rapid increase in groundwater levels during rain simulations. This rapid increase may be associated with preferential flow and has the potential to transport Pu contaminated soil particles into the groundwater.

To further characterize the fate and transport of Pu and Am into groundwater, the investigation includes the following components, First, the groundwater at the Site will be collected using dialysis cells and analyzed for actinides, metals, major anions, and other water quality parameters. Results from this phase of the investigation will establish ambient groundwater quality conditions. Second, both vadose zone water and groundwater samples will be collected in conjunction with measurements of groundwater recharge during controlled rain simulations. The analytical results from these samples and the recorded fluctuations in groundwater will be used to assess the quality of the water responsible for recharge to the alluvial aquifer. Third, synthetic microspheres will be applied to the surface of the study area. Movement of these microsphere into the subsurface as a result of rain simulation will establish the pathway for migration of soil particles from the surface to the subsurface. The extent of the microsphere migration, if any, will be used to determine the importance of groundwater recharge through soil macropores.

Microsphere migration will be measured by fluorescent microscopy. Aliquots of collected samples will be viewed using a Leitz Laborlux D microscope fitted with a mercury light source and the appropriate light filters to excite the fluorescent properties of the microspheres. This equipment is located in room 108 of the Geolog Building at the University of Colorado in Boulder.

This investigation will be conducted during the 1995 Spring and Summer field season with the results expectec in early 1996.

Sample Preparation

All sample preparation will be conducted in the designated radiological controlled area (RCA) in Trailer 891L at Rocky Flats. Water samples collected at the soil study site will have 10 milliliter aliquots taken for microsphere analysis. From each sample aliquot approximately one milliliter of homogenized water will be placed on an etched glass slide and slowly evaporated under a heat lamp. The remaining residue will be covered with a glass slip. The glass slip will then be sealed to the glass slide with a paraffin bead.

After the samples are prepared, the exterior of each slide will be surveyed for fixed plus removable and removable radiological contamination by the project health and safety officer. Only samples that meet unrestricted released limits per the EG&G Rocky Flats Environmental Remediation Management Guideline 3.02 will be transported to the University of Colorado for viewing.

There will be no sample preparation at the University of Colorado laboratory and cover slips will not be removed. A estimate of the likely $^{239/240}$Plutonium and ^{241}Americium activities in each 1 ml sample is .02 picocuries and .003 picocuries respectively. These values were calculated using the maximum analytically determined activity of each isotope in groundwater at the study site.

400 VALLEY ROAD
WARRINGTON, PA. 18976
(215)343-6484

S AFETY
D ATA
S HEET

d a t e 05/19/95

SECTION I IDENTIFICATION
Product Name: FLUORESBRITE MICROSPHERES, PLAIN AND CARBOXYLATE, 2.5% SOLIDS
Chemical Name:

SECTION II HAZARDOUS INGREDIENTS DATA
Hazardous Components:

None. This material has no hazards declarable under 29 CFR, 1200.

SECTION III PHYSICAL DATA
Appearance and Odor : OPAQUE LIQUID, WHITE OR DYED; NONE

POLYSCIENCES, INC. HAZARD CODE: A2dmw

* *
* POLYSCIENCES,INC. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. Individuals receiving this information must exercise their independent judgement in determining its appropriatness for a particular purpose. POLYSCIENCES, INC. makes no representations or warranties, either expressed or implied of merchantability, fitness for particular purposes with respect to the information set forth herein or to which the information refers. Accordingly POLYSCIENCES, INC. will not be responsible for damages resulting from the use of or reliance upon this information. *
* *

SPECIAL PRECAUTIONS
Precautions to be Taken in Handling and Storage: Store at 4 deg. C. Keep storage container tightly closed. Avoid contact with skin and eyes Do not inhale. Wash thoroughly after handling.

TOTAL P.02

Transportation and Sample Custody

Prepared slides will be placed in plastic slide boxes. Slide boxes will then be placed in an unmarked hand-held cooler along with a sample custody form. The custody form will include the sample number associated with each slide and the total number of slides in the cooler. A maximum of 50 slides will be transported at any one time.

Sample Storage and Disposal

All slides that have been viewed will be stored in the EG&G Soil Science Program sample storage Connex RCA at Rocky Flats. Slide disposal will be consistent with Rocky Flats procedure. No samples will be disposed of in any location other than Rocky Flats.

Slide Viewing

Slide viewing at the University of Boulder Laboratory will be limited to normal laboratory hours. All sample handling procedures as required under the University of Colorado radiological licenses and prescribed by the University of Colorado Radiological Health Department will be explicitly followed.

Rick Gentry
Radiological Engineering

Dr. Iggy Litaor
Project Manager

5/9/95

John Gregg
Project Health and Safety Officer

Greg Litus
Principle Investigator

Health and Safety Plan (HASP) Addendum #6

PLANNED SITE DECOMMISSIONING ACTIVITIES DURING LATE '95 & EARLY '96 and REDUCTION IN THE BUDDY SYSTEM REQUIREMENT

(Addendum to "Supplement to Site-Specific Safety and Health Plan, Operable Unit No.2, Surficial Soil Program)

Prepared by: Steven W. Aldridge / Steven W. Aldridge / Radiological Control Technician / 10/25/95
Name / Signature / Title / Date

Introduction

This HASP addendum covers planned site decommissioning activities to be performed during late '95 and early '96, in the OU2 Americium Zone area after the termination of the Soil Science Programs research activities. This addendum also covers a proposed reduction in the buddy system requirement for personnel in the former research area. All activities described in the addendum will be conducted in accordance with the Supplement to Site-Specific Safety and Health Plan, Operable Unit. No.2, Surficial Soil Program.

Addition of Decommissioning Activities Task

An additional task will be added to this HASP's previous eleven tasks, this is a site decommissioning activities task. The planned site decommissioning activities consist of following activities: disassembling the soil and meteorological monitoring equipment; general site cleanup and radiologically surveying equipment and trash out of the OU2 Americium Zone Soil Contamination Area

Reduction of the Buddy System Requirement

Due to the extensive hazard characterization of the site and to the non-intrusive activities of the decommissioning task it has been determined that the buddy system is not necessary for personnel entering the OU 2 Americium Zone. This only applies to individuals who have constant radio communications access while in the area. Individuals schedules to work in the field will notify Environmental Restoration Operations personnel by radio (frequency ER-COM) prior to initiating any field activities. The E.R. Operations personnel to be contacted are Andrea Casillas or Ty Vess, they can also be reached by phone at X5302 and X6540, respectively.

During the decommissioning process it will necessary to move and/or work with sealed lead acid marine deep cycle batteries and also to work with exposed soils, in these cases though infrequent the buddy system will be required for these activities.

Changes in the Personal Protective Equipment (PPE)

The changes in the type of PPE required in the OU2 Americium Zone will be detailed in the new Radiation Work Permit (RWP) for the Soil Contamination Area.

I. H. Approval: Peggy Schneckengast / Peggy Schneckengast / RMRS Health and Safety / 10-26-95
Name / Signature / Title / Date

Rad. Engineer Approval: T. Anderson, , Health Physicist , 10/26/95
Name / Signature / Title / Date

C.T.R. Approval: Gary R. Kerwin / Gary R. Kerwin / RMRS Permitting Mgr. / 10-26-95
Name / Signature / Title / Date

Health and Safety Plan (HASP) Addendum #8
RMRS SITE DECOMMISSIONING ACTIVITIES DURING SEPTEMBER AND OCTOBER 1997 and ACTIVITY HAZARD ANALYSIS (AHA) FOR ACTIVITIES
(Addendum to the "Supplement to Site-Specific Safety and Health Plan, Operable Unit No. 2, Surficial Soil Program")

Prepared by:	Steven Aldridge/		/RMRS Site Supervisor/	9-9-97
	Name	Signature	Title	Date

Introduction
This HASP addendum covers planned site decommissioning activities to be performed during September and October 1997, in the Pad 903 Lip Area of the terminated Surficial Soils Program (SSP) Soil Contamination Area (SCA) site. This addendum covers the RMRS activities for removal of SSP instrumentation and miscellaneous debris. All activities described in this addumdum will be conducted in accordance with the Supplement to Site-Specific Safety and Health Plan, Operable Unit No. 2, Surficial Soil Program and its previous addenda.

Objectives
The Surfical Soil Program instrumentation and debris will be dismantled and removed from the area with out any intrusive activities. This will involve preparing the site by cutting the tall vegetation to make access easier and safer; removal and radiological survey of instrumentation and debris; disposal of debris to the landfill; inventory of instrumentation and final dispositioning of instrumentation to a conex in contractor yard.

Tasks
The following tasks will be performed to accomplish the site decommissioning.

1. Cutting down overgrown vegetation by site laborers with Weed Eaters.
2. Disconnecting and disassembling of SSP instrumentation and debris by site laborers.
3. Radiological survey and onsite release of instrumentation and debris by site Radiological Control Technicians (RCTs).
4. Cleaning and disinfecting of possible mouse infested tool cabinet and instrumentation boxes by site laborers. Laborers wearing Air Purifying Respirators (APR) with MSA GMC-H cartridges, will spray down all interior surfaces of cabinet and boxes with a disinfectant solution (nine parts water mixed with one part household bleach) described in addendum "Clean out and Decontamination of Wooden Shed", 3/16/94. Once the cabinet and/or boxes are disinfected personnel will sweep out the tools and mouse debris onto plastic where the tools can be segregated. Mouse debris will be bagged and dispositioned to the landfill. PPE requirements for this activity in addition to APR will be DOE coveralls, inner nitrile gloves, outer long cuffed nitrile gloves, steel toe shoes and boot covers or steel toed PVC boots. At the discretion of the Site Safety Officer, additional personal protection equipment (PPE) may be added for splash protection if necessary. Decontamination will be conducted in accordance with Addendum "Clean out and Decontamination of Wooden Shed", 3/16/94, Decontamination section. The Hazard Assessment for this activity is covered in Addendum "Clean out and Decontamination of Wooden Shed", 3/16/94
5. SSP platforms and associated debris will be disassembled, surveyed and loaded into trucks to be sent to the landfill by onsite trucking personnel.
6. Site Supervisor will inventory all SSP instrumentation.
7. All released instrumentation will be transported by onsite trucking personnel to the contractors yard and stored in a connex.

Changes in the Personal Protective Equipment (PPE)
The changes in the type of PPE required in the SCA are detailed in the Radiological Work Permit (RWP) number 97-549-6260, and includes Modesty Clothing (DOE cotton coveralls), 2 pairs of Surgeon Gloves (Nitrile Gloves), and Shoe Covers.

Personnel requirements

It is anticipated that 3 to 4 laborers, 3 to 4 RCTs, 2 truckers and 1 RMRS Site Supervisor / Site Safety Officer will be needed to complete these tasks.

Equipment and Chemicals

The following equipment will be or may be utilized to accomplish the tasks described above:

1. Small hand tools - hammers, saws, etc.
2. Garden Sprayer
3. Household bleach
4. Water for drinking and decontamination
5. Weed Eaters
6. Generators
7. Gasoline
8. Gasoline safety cans
9. Fire extinguishers
10. MSA Full Face APRs
11. Drinking water cooler and paper cups
12. Paper Towels, plastic bags, PPE and trash

Additional equipment may be necessary but not called out here.

Unanticipated Hazards

Unanticipated hazards or conditions encountered during this project will be managed in accordance with this RMRS policy statement. "In the event unanticipated hazards or conditions are encountered, the project activities will pause to assess the potential hazard or condition. The potential hazard or condition will be evaluated to determine the severity or significance of the hazard or condition and whether the controls on the project are sufficient to address the hazard or condition. Based on this initial evaluation, a determination will be made whether to proceed with controls currently in place; segregate the hazard or condition from the project activity, if it can be done safely; or curtail operations to address the unexpected hazard or condition. Concurrence to proceed down the selected path must be obtained from the the RMRS Project Manager and the RMRS Vice President or their designee. In addition, the resumption of field activities involving radiological issues will be in accordance with Article 345 of the RFETS Radiological Control Manual." **Note:** "Unanticipated Hazards or Conditions" do not replace conditions, which require emergency response, rather, they ensure that all work is performed based on an informed approach in regards to all potential hazards.

The following sections list possible "Unanticipated Hazards or Conditions" and the corresponding response action. Each individual workers has the right to stop work due to unanticipated hazards or conditions and report to the RMRS Site Supervisor or RMRS Management per RMRS Operations Order 001-Notification.

Equipment Radiological Contamination >Transuranic Release Limits

All material and equipment exiting the SCA will be surveyed per ROI-3.01. Should any survey results indicate contamination levels greater than those in the RFETS Radiological Control Manual, Table 2-2 the following actions will be taken:

- All activities will be immediately suspended and RMRS Site Supervisor and RMRS Project Manager or designee will be notified;
- RFETS Radiological Engineering will be notified;
- The source of the contamination will be identified and controlled;
- The contaminated material or equipment will be contained, handled, and transferred in accordance with HSP-18.10, "Radioactive Material Transfer and Unrestricted Release of Property and Waste";
- Based on the survey results, the area radiological postings, RWP, controls, and work practices will be reviewed and modified as necessary; and
- Upon approval from the RMRS Project Manager the RMRS Vice President or their designee, and when applicable the Site Radiological Control Manager, work activities will resume.

PPE or Personnel Radiological Contamination

If contamination levels are detected on PPE or personnel, as confirmed with the AP-2, the following actions will be taken:

- All activities will be immediately suspended and RMRS Site Supervisor and RMRS Project Manager or designee will be notified;
- RFETS Radiological Engineering will be notified;
- Depending on the location and level of contamination the, appropriate actions will be taken to protect the contaminated PPE, the individual, and personnel in the area;
- Personnel with detectable DOE radiological contamination (per ROI 2.01) on skin or on personal clothing will be transported to Bldg. 122 for decontamination;
- The source of the contamination will be identified and controlled;
- Based on the contamination levels, the area postings, RWP, and work practices will be reviewed and modified; and
- Upon approval from the RMRS Project Manager the RMRS Vice President or their designee, and when applicable the Site Radiological Control Manager, work activities will resume.

Change In Personnel Identifications

Radiological Control Technician (RCT) will replace the "Supplement to Site-Specific Safety and Health Plan, Operable Unit No. 2, Surficial Soil Program" designation for Health and Safety Specialists (HSS). The RCTs will be responsible for radiation monitoring activities.

Site Laborers will replace the Field Technicians for the above described activities.

RMRS personnel will replace Stoller and Walsh designated personnel. An organization chart and Emergence phone list for RMRS personnel will be attached.

Change to the Heat Stress and Cold Monitoring Guidelines

Heat stress monitoring will be completed using an Imaging and Sensing Technology, Model RSS 214, (and/or equivalent) Heat Stress Monitor. The instrument is a microprocessor based Wet Bulb Globe Thermometer (WBGT) which accurately measures environmental factors, which contribute to heat stress. The WBGT reading displayed by the instrument, in either Fahrenheit or Celsius, is a weighted sum of the dry bulb, wet bulb, and Vernon globe temperatures. The WBGT is calibrated prior to use on a daily basis

and a yearly factory calibration and servicing is recommended. Daily calibration will be per the manufacturer specifications and results will be entered in the Industrial Hygiene Instrumentation Calibration Logbook. Maintenance is minimal with only the wet bulb wick requiring periodic replacement. Monitoring frequency will depend on the work area temperature, the type of work being performed, and the type of PPE worn. See Appendix A for guidance and action levels for work involving the use of personal protective equipment. Readings in the field will be logged on the Daily WBGT Log. Personnel heat stress monitoring may be conducted in conjunction with WBGT monitoring especially for unacclimated workers.

Cold Stress Monitoring

Cold stress monitoring will be accomplished by obtaining the air temperature and the wind speed and calculating the equivalent chill temperature using the ACGIH table found in Appendix A. Once in the field, wind speed, temperature, and equivalent chill temperature will be logged on the Daily Wind Speed/Cold Stress Log.

Activity Hazard Analysis

Activity Hazard Analysis for the activities described above will be attached.

	Name	Signature	Date
RMRS Project Manager Approval:	IAN PATON	Ian Paton	9/11/97
RMRS I.H. Approval:	M.D. Schreckengast	M.D. Schreckengast	9-11-97
SSOC Rad. Engineering Approval:	H. B. ESTABROOKS	H B Estabrooks	9/11/97

RMRS Pad 903 Lip Area SCA Surficial Soil Program Site Decommissioning and Instrumentation Removal Project

Activity Hazard Analysis

9-97

Activity	Hazard	Preventative Measures
All site activities	General work hazards	• All personnel will wear steel-toed shoes, safety glasses with side shields, and hearing protection as applicable. Hard hats will be worn during overhead work. The SSO will determine when hard hats are required.
	Heat stress	• Heat stress monitoring will be conducted in regards to work load and PPE worn as applicable.
	Cold stress	• Cold stress monitoring will be conducted as applicable. • Proper clothing will be available to all personnel and administrative controls will be adhered to.
	Noise	• Noise monitoring will be conducted as applicable. • In high noise area (>85dBA) personnel will wear hearing protection. • All personnel will participate in the RFETS Hearing Conservation Program if necessary.
Traversing the site	Slip, trips, falls	• Care will be taken when traversing the site especially when carrying equipment. • All trip hazards will be immediately removed or marked when identified.
Lifting equipment and materials	Back injury	• Proper lifting techniques will be used.
Handling equipment and materials	Pinch points and sharp edges	• Care will be taken when pinch points and sharp edges exist and heavy-duty leather work gloves will

RMRS Pad 903 Lip Area SCA Surficial Soil Program Site Decommissioning and Instrumentation Removal Project(Continued)

Activity Hazard Analysis

Activity	Hazard	Preventative Measures
		be worn.
Cutting vegetation	Flying debris	• Personnel will be required wear safety glasses or goggles while cutting weeds with Weed Eaters
	Noise	• Personnel will be required to wear hearing protection
	Fire	• At a minimum, a 10 lb. ABC fire extinguisher will be located in the work area and next to the generator. • All refueling will be conducted at the beginning of the shift when the generators are cool. • Fuel containers will be electrically bonded to the light plants and generators during refueling.
	Use of gasoline	• Follow recommendations on MSDS (see Appendix B).
Using hand tools and power hand tools to disassemble SSP instrumentation	Hand tools in unsafe operating condition	• The user prior to each use will inspect hand tools. • Defective tools will be tagged and taken out of service.
	Improper use of hand tools	• Hand tools will be utilized for their intended use and operated in accordance with HSP-12.10. • Guards will be in place and no modifications will be made.
	Improper electrical connections	• All electrical wiring and connections will be performed by a experienced technician
	Electrical shock	• Portable power tools will be plugged into a GFCI protected

RMRS Pad 903 Lip Area SCA Surficial Soil Program Site Decommissioning and Instrumentation Removal Project(Continued)

Activity Hazard Analysis

Activity	Hazard	Preventative Measures
		outlet and will be UL listed with three pronged ground plug or double insulated. • Cords will be inspected by the user and protected from unnecessary damage. • Any tool whose cord shows signs of damage or deterioration will be immediately removed from service.
Use of generators to power portable power tools	Electrical shock	• Extension cords will be intended for outdoor use, inspected by the user, and protected from unnecessary damage. • Any extension cords, which show signs of damage or deterioration, will be immediately removed from service.
	Electrical shock	• Cords will be plugged into a GFCI protected outlet and the generator will be properly grounded. • The user daily prior to the beginning of each shift will test the GFCI.
	Fire	• At a minimum, a 10 lb. ABC fire extinguisher will be located in the work area and next to the generator. • All refueling will be conducted at the beginning of the shift when the generators are cool. • Fuel containers will be electrically bonded to the light plants and generators during refueling.

RMRS Pad 903 Lip Area SCA Surficial Soil Program Site Decommissioning and Instrumentation Removal Project(Continued)

Activity Hazard Analysis

Activity	Hazard	Preventative Measures
	Use of gasoline	• Follow recommendations on MSDS (see Appendix B).
Disinfecting tool wooden cabinet and wooden instrumentation boxes	Exposure to the Hantavirus	• Personnel with be required to wear MSA full face repirators with GMC-H cartridges • Protective gloves will be worn when contacting possibly contaminated material
	Use of chlorine Bleach	• Follow recommendations on MSDS (see Appendix B).

Approved:	**Signature**	**Date**
RMRS Project Manager Ian Paton	Ian Paton	9/11/97
RMRS Site Supervisor/Site Safety Officer-Steven Aldridge	Steven Aldridge	9/11/97
RMRS H&S Supervisor-Peggy Schreckengast	Peggy Schreckengast	9/11/97
SSOC Radiological Engineer-Bates Estabrooks	W Bates Estabrooks	9/11/97

C:\WORD\RMRS\IggyAHA

APPENDIX A

HEAT AND COLD STRESS GUIDELINES

RMRS Rocky Mountain Remediation Services, L.L.C.
protecting the environment

INTEROFFICE MEMORANDUM

DATE: July 8, 1996

TO: Distribution

FROM: Ricky J. Carr, Environmental Safety &Health, Bldg. T664A, X2970

SUBJECT: HEAT STRESS - RJC-014-96

Action: None Required

The purpose of this memo is to provide guidance regarding the prevention and monitoring of heat stress conditions. It should be noted that heat stress related conditions or disorders (i.e. heat stroke, heat exhaustion) are considered to be occupational illnesses by OSHA and therefore are recordable cases. It is incumbent to prevent, monitor and mitigate conditions which may lead to heat stress among employees.

There is a draft Heat Stress Program that has been written by Kaiser-Hill L.L.C. (K-H) Industrial Hygiene and Safety and reviewed by the Industrial Hygiene and Safety organizations of the major subcontractors. This Heat Stress Program describes the responsibilities of various personnel regarding implementation of the Program and contains instructions for monitoring heat stress and provides guidelines for Threshold Limit Values (TLVs) and work/rest regimens. DOE Order 440.1, Worker Protection Management for DOE Federal and Contractor Employees requires compliance with the most recent edition of the ACGIH "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices" when TLVs are more protective than OSHA Permissible Exposure Limit (PELs) (there is no OSHA PEL for heat stress). The work/rest regimens specified in the Heat Stress Program are based upon the ACGIH TLVs modified by professional judgment for the use of impermeable personal protective clothing (PPE). These TLVs assume that the workers exposed to heat stress conditions are acclimatized.

It is (will be) Rocky Mountain Remediation Services (RMRS) policy to adhere the requirements of the Heat Stress Program including the work/rest regimens contained as Appendix 1 of the Program (attached). Prevention of potential heat stress conditions is the first method to be considered when heat stress is identified as a potential hazard associated with any activity or task. Prevention methods to be considered include work schedule, modification of task/activity, and provision for rest areas. The Heat Stress Program provides instructions for monitoring heat stress conditions using the Wet Bulb Globe Temperature (WBGT) Index. WBGT accounts for air temperature, relative humidity, and solar load and provides a mechanism for correlating environmental conditions with body temperature and other physiological responses to heat stress. The Heat Stress Program contains a Table for work/rest regimens based upon the WBGT Index, work activities, and level of Personal Protective Equipment (PPE). Work/rest regimens shall be established in accordance with guidelines in the Table with the following interpretations. Physiological monitoring (i.e. body temperatures, pulse rates) will be performed whenever practical and feasible in order to verify the work/rest regimens are appropriate considering the WBGT Index. The use of personal cooling devices such as ice vests or vortex cooling can be used to modify the WBGT Index

for a particular work activity and level of PPE. The WBGT Index can be lowered by 3∞ F if a personal cooling device is employed and physiological monitoring is performed to confirm that the personal cooling devices are effective (using the monitoring guidance provided on page 8-21 in the NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual for Hazardous Waste Activities). Additional modification to the WBGT Index when personal cooling devices are employed when be evaluated on a case-by-case basis. Column 2 will be employed if permeable protective clothing (regardless of respiratory protection) is utilized. Permeable protective clothing includes cotton and Kleenguard" coveralls. Column 3 will be employed if semi-permeable protective clothing (Tyvek) is utilized. Column 4 will be employed if impermeable protective clothing (Saranex) is utilized.

Please distribute this guidance to all personnel that have operations affected by heat stress considerations. Please don not hesitate to call if you have questions or comments.

RJC:clh

Attachment:
As Stated

Distribution

R. E. Bates
G. W. Beers
R. J. Carr
M. E. Findley
K. D. Jenkins
O. McAfee
R. A. McCafferty
A. W. Medina
T. T. Sangaline
M. D. Schrenkengast
T. N. Timmons

cc:

G. Aguero
C. A. Benson
C. Boardman
J. Chapin
J. A. Cuicci
C. S. Evans
R. C. Fitz
T. D. Gray
L. F. Johnson
J. E. Law
D. E. Steffen
M. R. Wagner
M. Wheeler
ESH&Q File
RMRS Records Center

RFETS HEAT STRESS PROGRAM

HEAT STRESS GUIDELINES FOR LIGHT WORK

(1)		(2)	(3)	(4)
WORK/REST	WBGT°F	WBGT°F	WBGT°F	WBGT°F
Continuous	86	76	72	68
75/25%	87	77	73	69
50/50%	89	78.5	74.5	70.5
25/75%	90	79.9	75.9	71.9

HEAT STRESS GUIDELINES FOR MODERATE WORK

(1)		(2)	(3)	(4)
WORK/REST	WBGT°F	WBGT°F	WBGT°F	WBGT°F
Continuous	80	70	66	62
75/25%	82	72.4	68.4	64.4
50/50%	85	74.9	70.9	66.9
25/75%	88	77.9	73.9	69.9

HEAT STRESS GUIDELINES FOR HEAVY WORK

(1)		(2)	(3)	(4)
WORK/REST	WBGT°F	WBGT°F	WBGT°F	WBGT°F
Continuous	77	67	63	59
75/25%	78	68.6	64.6	60.6
50/50%	82	72.2	68.2	64.2
25/75%	86	76	72	68

(1) No Personal Protective Equipment
(2) One pair coveralls (Anti C), modesty garments, gloves, hood, shoe covers.... (Level D Haz Mat PPE)
(3) Two pair coveralls (Anti C), modesty garments, gloves, hood, shoe covers....
or
One pair coveralls (Anti C), modesty garments, gloves, hood, respirator. (Level C Haz Mat PPE)
(4) Two pair coveralls (Anti C), modesty garments, gloves, hood, shoe covers, respirator. (Level A&B Haz Mat PPE)

Threshold Limit Values Work/Warm-up Schedule for Four-Hour Shift[a]

Air Temperature—Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx.)	°F (approx.)	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26° to -28°	-15° to -19°	(Norm. Breaks) 1		(Norm. Breaks) 1		75 min	2	55 min	3	40 min	4
-29° to -31°	-20° to -24°	(Norm. Breaks) 1		75min	2	55 min	3	40 min	4	30 min	5
-32° to -34°	-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	5	Non-emergency work should cease	
-35° to -37°	-30° to -34°	55 min	3	40 min	4	30 min	5	Non-emergency work should cease			
-38° to -39°	-35° to -39°	40 min	4	30 min	5	Non-emergency work should cease					
-40° to -42°	-40° to -44°	30 min	5	Non-emergency work should cease							
-43° & below	-45° & below	Non-emergency work should cease									

1. Schedule applies to any 4-hour work period with moderate to heavy work activity, with warm-up periods of ten (10) minutes in a warm location and with an extended break (e.g., lunch) at the end of the 4-hour work period in a warm location. For Light-to-Moderate Work (limited physical movement): apply the schedule one step lower. For example, at -35°C (-30°F) with no noticeable wind (Step 4), a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).
2. The following is suggested as a guide for estimating wind velocity if accurate information is not available:
   5 mph: light flag moves; 10 mph: light flag fully extended; 15 mph: raises newspaper sheet; 20 mph: blowing and drifting snow.
3. If only the wind chill cooling rate is available, a rough rule of thumb for applying it rather than the temperature and wind velocity factors given above would be: 1) special warm-up breaks should be initiated at a wind chill cooling rate of about 1750 W/m^2; 2) all non-emergency work should have ceased at or before a wind chill of 2250 W/m^2. In general, the warmup schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart slightly over-compensates for the actual temperatures in the colder ranges because windy conditions rarely prevail at extremely low temperatures.
4. TLVs apply only for workers in dry clothing.

[a]Adapted from Occupational Health & Safety Division, Saskatchewan Department of Labour

Windchill Index

Wind Speed in mph	ACTUAL THERMOMETER READING (F)									
	50	40	30	20	10	0	-10	-20	-30	-40
	EQUIVALENT TEMPERATURE (F)									
calm	50	40	30	20	10	0	-10	-20	-30	-40
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-21	-33	-46	-58	-70
15	36	22	9	-5	-18	-36	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-74	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
Over 40 mph (little added effect)	LITTLE DANGER (for properly clothed person)				INCREASING DANGER (Danger from freezing of exposed flesh)			GREAT DANGER		

APPENDIX B

MATERIAL SAFETY DATA SHEETS

Household Chlorine Bleach
Hydraulic Fluid
Liquinox®
Motor Oil
Unleaded Gasoline

The Clorox Company
7200 Johnson Drive
Pleasanton, California 94566
Tel. (415) 847-6100

Material Safety Data Sheet

CLOROX HMIS	
HEALTH	2*
FLAMMABILITY	0
REACTIVITY	1
Personal Protection	B

I Chemical Identification

NAME: REGULAR CLOROX BLEACH — **CAS no.** N/A

DESCRIPTION: CLEAR, LIGHT YELLOW LIQUID WITH CHLORINE ODOR — **RTECS no.** N/A

Other Designations	Manufacturer	Emergency Procedure
EPA Reg. No. 5813-1 Sodium hypochlorite solution Liquid chlorine bleach Clorox Liquid Bleach	The Clorox Company 1221 Broadway Oakland, CA. 94612	Notify your Supervisor Call your local poison control center or Rocky Mountain Poison Center (303) 573-1014

II Health Hazard Data

*Causes severe but temporary eye injury. May irritate skin. May cause nausea and vomiting if ingested. Exposure to vapor or mist may irritate nose, throat and lungs. The following medical conditions may be aggravated by exposure to high concentrations of vapor or mist: heart conditions or chronic respiratory problems such as asthma, chronic bronchitis or obstructive lung disease. Under normal consumer use conditions the likelihood of any adverse health effects are low. FIRST AID: EYE CONTACT: Immediately flush eyes with plenty of water. If irritation persists, see a doctor. SKIN CONTACT: Remove contaminated clothing. Wash area with water. INGESTION: Drink a glassful of water and call a physician. INHALATION: If breathing problems develop remove to fresh air.

III Hazardous Ingredients

Ingredients	Concentration	Worker Exposure Limit
Sodium hypochlorite CAS# 7681-52-9	5.25%	not established

None of the ingredients in this product are on the IARC, NTP or OSHA carcinogen list. Occasional clinical reports suggest a low potential for sensitization upon exaggerated exposure to sodium hypochlorite if skin damage (eg. irritation) occurs during exposure. Routine clinical tests conducted on intact skin with Clorox Liquid Bleach found no sensitization in the test subjects.

IV Special Protection Information

Hygienic Practices: Wear safety glasses. With repeated or prolonged use, wear gloves.

Engineering Controls: Use general ventilation to minimize exposure to vapor or mist.

Work Practices: Avoid eye and skin contact and inhalation of vapor or mist.

V Special Precautions

Keep out of reach of children. Do not get in eyes or on skin. Wash thoroughly with soap and water after handling. Do not mix with other household chemicals such as toilet bowl cleaners, rust removers, vinegar, acid or ammonia containing products. Store in a cool, dry place. Do not reuse empty container; rinse container and put in trash container.

VI Spill or Leak Procedures

Small quantities of less than 5 gallons may be flushed down drain. For larger quantities wipe up with an absorbent material or mop and dispose of in accordance with local, state and federal regulations. Dilute with water to minimize oxidizing effect on spilled surface.

VII Reactivity Data

Stable under normal use and storage conditions. Strong oxidizing agent. Reacts with other household chemicals such as toilet bowl cleaners, rust removers, vinegar, acids or ammonia containing products to produce hazardous gases, such as chlorine and other chlorinated species. Prolonged contact with metal may cause pitting or discoloration.

VIII Fire and Explosion Data

Not flammable or explosive. In a fire, cool containers to prevent rupture and release of sodium chlorate.

IX Physical Data

Boiling point----------212°F/100°C (decomposes)
Specific Gravity (H_2O=1)----------1.085
Solubility in Water----------complete
pH----------11.4

DATE PREPARED 8/87

16954

DATA SUPPLIED IS FOR USE ONLY IN CONNECTION WITH OCCUPATIONAL SAFETY AND HEALTH.

ELEMENTS (ICP)

METHOD: 7300
ISSUED: 2/15/84

M.W.: Table 1

OSHA/NIOSH/ACGIH: Table 1

PROPERTIES: Table 1

ELEMENTS:	aluminum	cobalt	manganese	silver	tungsten
	arsenic	copper	molybdenum	sodium	vanadium
	beryllium	iron	nickel	tellurium	yttrium
	cadmium	lead	phosphorus	thallium	zinc
	calcium	lithium	platinum	tin	zirconium
	chromium	magnesium	selenium	titanium	

SYNONYMS: vary depending upon the compound.

SAMPLING

SAMPLER: FILTER
(0.8-µm, cellulose ester membrane)

FLOW RATE: 1 to 4 L/min

VOL-MIN: Table 1
-MAX: Table 1

SHIPMENT: routine

SAMPLE STABILITY: stable

BLANKS: 2 to 10 field blanks per set

ACCURACY

RANGE STUDIED: not studied

BIAS: none identified

OVERALL PRECISION (s_r): not evaluated

MEASUREMENT

TECHNIQUE: INDUCTIVELY COUPLED ARGON PLASMA, ATOMIC EMISSION SPECTROSCOPY

ANALYTE: elements above

ASHING REAGENTS: conc. HNO_3, 4 mL; and conc. $HClO_4$, 1 mL

CONDITIONS: room temperature, 30 min; 150 °C to near dryness

FINAL SOLUTION: 4% HNO_3, 1% $HClO_4$, 10 mL

WAVELENGTH: depends upon element; Table 2

BACKGROUND CORRECTION: spectral wavelength shift

CALIBRATION: elements in 4% HNO_3, 1% $HClO_4$

RANGE: 2.5 to 1000 µg per sample [1]

ESTIMATED LOD: 1 µg per sample [1]

PRECISION (s_r): Table 2

APPLICABILITY: The working range of this method is 0.005 to 2.0 mg/m³ for each element in a 500-L air sample. This is simultaneous elemental analysis, not compound specific. Verify that the types of compounds in the samples are soluble with this ashing procedure.

INTERFERENCES: Spectral interferences are the primary interferences encountered in ICP-AES analysis. These are minimized by judicious wavelength selection, interelement correction factors and background correction [1,2].

OTHER METHODS: This method replaces P&CAM 351 [2] for trace elements. Atomic absorption spectroscopy (e.g., Methods 70XX) is an alternate analytical technique for many of these elements.

REAGENTS:

1. Nitric acid, conc.
2. Perchloric acid, conc.*
3. Ashing acid: 4:1 (v/v) HNO_3:$HClO_4$. Mix 4 volumes conc. HNO_3 with 1 volume conc. $HClO_4$.
4. Calibration stock solutions, 1000 µg/mL. Commercially available, or prepared per instrument manufacturer's recommendation (see step 12).
5. Dilution acid, 4% HNO_3, 1% $HClO_4$. Add 50 mL ashing acid to 600 mL water; dilute to 1 L.
6. Argon.
7. Distilled,deionized water.

*See Special Precautions.

EQUIPMENT:

1. Sampler: cellulose ester membrane filter, 0.8-µm pore size, 37-mm diameter; in cassette filter holder.
2. Personal sampling pump, 1 to 4 L/min, with flexible connecting tubing.
3. Inductively coupled plasma-atomic emission spectrometer, equipped as specified by the manufacturer for analysis of elements of interest.
4. Regulator, two-stage, for argon.
5. Beakers, Phillips, 125-mL, or Griffin, 50-mL, with watchglass covers.*
6. Volumetric flasks, 10- and 100- mL.*
7. Assorted volumetric pipets as needed.*
8. Hotplate, surface temperature 150 °C.

*Clean all glassware with conc. nitric acid and rinse thoroughly in distilled water before use.

SPECIAL PRECAUTIONS: Perform all perchloric acid digestions in a perchloric acid hood.

SAMPLING:

1. Calibrate each personal sampling pump with a representative sampler in line.
2. Sample at an accurately known flow rate between 1 and 4 L/min for a total sample size of 200 to 2000 L (see Table 1) for TWA measurements. Do not exceed a filter loading of approximately 2 mg total dust.

SAMPLE PREPARATION:

3. Open the cassette filter holders and transfer the samples and blanks to clean beakers.
4. Add 5 mL ashing acid. Cover with a watchglass. Let stand 30 min at room temperature.
   NOTE: Start a reagent blank at this step.
5. Heat on hotplate (120 °C) until ca. 0.5 mL remains.
   NOTE: Some species of Li, Mn, Mo, Sn, W, and Zr will not be completely solubilized by this procedure. Alternative solubilization techniques for most of these elements can be found elsewhere [2,3,4,5,6,7].
6. Add 2 mL ashing acid and repeat step 5. Repeat this step until the solution is clear.
7. Remove watchglass and rinse into the beaker with distilled water.
8. Increase the temperature to 150 °C and take the sample to dryness.
9. Dissolve the residue in 2 to 3 mL dilution acid.
10. Transfer the solutions quantitatively to 10-mL volumetric flasks.
11. Dilute to volume with dilution acid.

CALIBRATION AND QUALITY CONTROL:

12. Calibrate the spectrometer according to the manufacturers recommendations.
    NOTE: Typically, an acid blank and 10 µg/mL multielement working standards are used. The following multielement combinations are chemically compatible in 4% HNO_3/1% $HClO_4$:
    a. Ag, Ca, Co, Mn, Pb, V, Zn;
    b. Al, Be, Cd, La, Li, Ni, Tl;
    c. As, B, Ba, Mg, Mo, P, Sn;

d. Cu, Fe, Na, Pt, Sr, Te, Y;
e. Cr, K, Sb, Se, Ti, Zr; and
f. Si, W (distilled water only)

13. Analyze a standard for every ten samples.
14. Check recoveries with at least two spiked media blanks per ten samples.

MEASUREMENT:

15. Set spectrometer to conditions specified by manufacturer.
16. Analyze standards and samples.

NOTE: If the values for the samples are above the range of the standards, dilute the solutions with dilution acid, reanalyze and apply the appropriate dilution factor in the calculations.

CALCULATIONS:

17. Obtain the solution concentrations for the sample, C_s (µg/mL), and the average media blank, C_b (µg/mL), from the instrument.
18. Using the solution volumes of sample, V_s (mL), and media blank, V_b (mL), calculate the concentration, C (mg/m^3), of each element in the air volume sampled, V (L):

$$C = \frac{C_s V_s - C_b V_b}{V}, \ mg/m^3.$$

EVALUATION OF METHOD:

Method P&CAM 351 was evaluated in 1981 [1,2]. The precision and recovery data were determined at 2.5 and 1000 µg of each element per sample on spiked filters. The precision and recovery data, instumental detection limits, sensitivity, and analytical wavelengths are listed in Table 2. The values in Table 2 were determined with a Jarrell-Ash Model 1160 ICP operated according to manufacturer's instructions.

REFERENCES:

[1] Hull, R.D. "Multielement Analysis of Industrial Hygiene Samples," NIOSH Internal Report, presented at the American Industrial Hygiene Conference, Portland, Oregon (May 1981).
[2] NIOSH Manual of Analytical Methods, 2nd ed., V. 7, P&CAM 351, U.S. Department of Health and Human Services, Publ. (NIOSH) 82-100 (1981).
[3] Ibid, S341 (Lead).
[4] Ibid, V. 2, S5 (Manganese), U.S. Department of Health, Education, and Welfare, Publ. (NIOSH) 77-157-B (1977).
[5] Ibid, V. 4, P&CAM 271 (Tungsten), U.S. Department of Health, Education, and Welfare, Publ. (NIOSH) 78-175 (1978).
[6] Ibid, V. 5, P&CAM 173 (Metals by Atomic Absorption), U.S. Department of Health, Education, and Welfare, Publ. (NIOSH) 79-141 (1979).
[7] Ibid, V. 3, S183 (Tin), S185 (Zirconium), and S376 (Molybdenum), U.S. Department of Health, Education, and Welfare, Publ. (NIOSH) 77-157-C (1977).

METHOD REVISED BY: R. DeLon Hull and Mark Millson, NIOSH/DPSE.

Table 1. Properties and sampling volumes.

Element (Symbol)	Properties: Atomic Weight	Properties: MP, °C	Permissible Exposure Limits, mg/m³ TWA OSHA/NIOSH/ACGIH	Air Volume @ OSHA, L: MIN	Air Volume @ OSHA, L: MAX
Silver (Ag)	107.87	961	0.01/ -- / 0.1	250	2000
Aluminum (Al)	26.98	660	-- / -- / 10.	5 (g)	100 (g)
Arsenic (As)	74.92	817*	0.5/C 0.002/ 0.2	5	2000
Beryllium (Be)	9.01	1278	0.002/ 0.0005/ 0.002	1250	2000
Calcium (Ca)	40.08	842	5 (b)/ -- / 2 (b)	5	200
Cadmium (Cd)	112.40	321	0.2/ 0.04/ 0.05	13	2000
Cobalt (Co)	58.93	1495	0.1/ -- / 0.1	25	2000
Chromium (Cr)	52.00	1890	1.0 (c)/ 0.025/ 0.5 (c)	5	1000
Copper (Cu)	63.54	1083	1.0/ -- / 1.0	5	1000
Iron (Fe)	55.85	1535	10 (b)/ -- / 5 (b)	5	100
Lithium (Li)	6.94	179	0.025 (d)/ -- / 0.025 (d)	100	2000
Magnesium (Mg)	24.31	651	15 (b)/ -- / 10 (b)	5	67
Manganese (Mn)	54.94	1244	C 5/ -- / C 5	5	200
Molybdenum (Mo)	95.94	651	15 (e)/ -- / 10 (e)	5	67
Sodium (Na)	22.99	98	2 (f)/ C 2 (f)/ C 2 (f)	13	2000
Nickel (Ni)	58.71	1453	1/ 0.015/ 1 (c)	5	1000
Phosphorus (P)	30.97	44	-- / -- / 0.1	25 (g)	2000 (g)
Lead (Pb)	207.19	328	0.05/ 0.1/ 0.15	50	2000
Platinum (Pt)	195.09	1769	0.002 (a)/ -- / 1 (c)	1250	2000
Selenium (Se)	78.96	217	0.2/ -- / --	13	2000
Tin (Sn)	118.69	232	2/ -- / 2 (c)	5	500
Tellurium (Te)	127.60	450	0.1/ -- / 0.1	25	2000
Titanium (Ti)	47.90	1675	-- / -- / 10 (b)	5	100
Thallium (Tl)	204.37	304	0.1 (a)/ -- / 0.1 (a)	25	2000
Vanadium (V)	50.94	1890	C 0.5/ 1 (c)/ 0.05 (V_2O_5)	5	2000
Tungsten (W)	183.85	3410	-- / 5 (e)/ 5 (e)	5 (g)	200 (g)
Yttrium (Y)	88.91	1495	1/ -- / 1	5	1000
Zinc (Zn)	65.37	419	5 (b)/ 5 (b)/ 5 (b)	5	200
Zirconium (Zr)	91.22	1852	5/ -- / 5	5	200

(a) soluble
(b) oxide
(c) metal
(d) hydride
(e) insoluble
(f) hydroxide
(g) at the ACGIH TLV

CITGO Petroleum Corporation
P. O. Box 3758
Tulsa, Oklahoma 74102

Material Safety Data Sheet

Generic Name: CITGO Hydraulic Fluids SUS-2 Date: February 20, 1997

Generic Code: HF-002

THIS GENERIC MSDS REPRESENTS THE FOLLOWING CITGO PRODUCTS:

Trade Name	Commodity Code No.
CITGO Pacemaker 32	33-001
CITGO Pacemaker 19	33-013
CITGO A/W Hydraulic Oil 22	33-410
CITGO A/W Hydraulic Oil 32	33-415
CITGO A/W 32 Dover	33-477
CITGO A/W-D Hydraulic Oil 32	33-481
CITGO Pacemaker T-32	33-715
CITGO A/W All Temperature Hydraulic Oil	33-932

Synonyms:	Lubricating Oil	Technical Contact:	(918) 495-5933
CAS No.:	Mixture (Refer to Section 1)	Medical Emergency:	(918) 495-4700
CITGO Index No.:	1965	CHEMTREC Emergency:	(800) 424-9300

MATERIAL HAZARD EVALUATION

(Per OSHA Hazard Communication Standard [29 CFR 1910.1200])

Health Precautions: **WARNING:** Oil injected into the skin from high pressure leaks in hydraulic systems can cause severe injury. Most damage occurs during the first few hours. Seek medical attention immediately. Surgical removal of oil may be necessary. Protect exposed skin from repeated or prolonged exposure.

Safety Precautions: Do not store material in open or unmarked containers.

HMIS Rating[1] Health: 0 Flammability: 1 Reactivity: 0

1.0 GENERIC COMPOSITION / COMPONENTS

Components	CAS No.	%	Hazard Data
Refined Petroleum Oil(s)	Refer to Section 11	> 95	Oral LD_{50} (rat): > 5 g/kg Dermal and Eye: Mild-irritant Inhalation LC_{50}/4H (rat): > 5,000 mg/M^3 Hazard data are based upon similar components.

[1]Hazard Rating: least-0, slight-1, moderate-2, high-3, extreme-4.
CITGO assigned these values based upon an evaluation conducted pursuant to NPCA guidelines. Use of an asterisk (*) indicates that the material may present chronic health effects.

1.0 GENERIC COMPOSITION / COMPONENTS (continued)

Components	CAS No.	%	Hazard Data	
Anti-oxidant/Anti-wear Agent (may contain Zinc Dialkyldithiophosphate)	Mixture	< 2	Oral: Eye: Dermal: Inhalation:	Potential aspiration hazard. Mild to moderate irritant. Mild to moderate irritant. Potential respiratory tract irritant.
VI Improver	Mixture	0 - 5	Oral LD_{50} (rat): Dermal LD_{50} (rabbit): Dermal: Eye:	> 5 g/kg > 2 g/kg Mild irritant. May be absorbed through the skin. Potential irritant.

2.0 PHYSICAL DATA

PHYSICAL HAZARD CLASSIFICATION (Per 29 CFR 1910.1200)

Combustible	No	Flammable	No	Pyrophoric	No
Compressed Gas	No	Organic Peroxide	No	Reactivity	No
Explosive	No	Oxidizer	No	Stable	Yes

Boiling Point, 760 mm Hg, °C (°F):	~ 278 - 390 (~ 533 - 740)
Specific Gravity (60//60 °F) (H_2O = 1):	~ 0.86 - 0.88
Vapor Density (Air = 1):	> 1
% Volatiles by Volume:	Negligible
Melting Point, °C (°F):	NA
Vapor Pressure, mm Hg (25°C):	~ $2x10^{-5}$ to $4x10^{-4}$
Solubility in Water:	Negligible
Evaporation Rate (n-butyl acetate = 1):	< 1
pH of Undiluted Product:	NA
Appearance and Odor :	Light amber liquid, mild petroleum odor.

3.0 FIRE AND EXPLOSION DATA

Flash Point, OC, °C (°F)	185 - 236 (365 - 453)
Flash Point, CC, °C (°F)	ND
Autoignition Temperature, °C (°F)	ND
NFPA Rating[2]	Health: 0 Flammability: 1 Reactivity: 0
Flammable Limits (% by volume in air)	Lower: ND Upper: ND
Extinguishing Media	CO_2, dry chemical, foam, water fog.
Special Fire Fighting Procedure	None.
Unusual Fire or Explosion Hazard	Water may cause frothing. Material may be ignited by sparks or flames.

[2]Hazard Rating: least-0; slight-1; moderate-2; high-3; extreme-4.
CITGO assigned these values based upon an evaluation conducted pursuant to NFPA guidelines.

4.0 REACTIVITY DATA

Stability:	Stable.
Conditions Contributing to Instability:	None.
Incompatibility:	This material may react with strong oxidants, acids and caustics.
Hazardous Decomposition Products: (thermal, unless otherwise specified)	CO_2, (CO with incomplete combustion), and possible trace oxides of nitrogen phosphorus, sulfur and zinc.
Hazardous Polymerization:	Hazardous polymerization is not expected to occur.

5.0 SPILL, LEAK AND DISPOSAL PROCEDURES

Procedure if Material is Spilled:

- Remove all ignition sources.
- Isolate the area of the spill and restrict access to persons wearing protective clothing.
- Ventilate area of release, as necessary, to disperse vapors and mists.
- **Small Spills:** Absorb released material with non-combustible absorbent. Place into containers for later disposal. (See Waste Disposal section below.)
- **Large Spills:** Evacuate area in the event of significant spills. Evaluate exposure potential. Potential exposure may require the use of respiratory protection. Use protective clothing. Contain spill in temporary dikes to avoid product migration and to assist in recovery. Do not allow material to escape into sewers, ground water, drainage ditches or surface waters.
- Administer appropriate first aid.
- Report releases as required to the appropriate federal, state and local authorities.

Waste Disposal:

- It is the responsibility of the user to determine if the material is a hazardous waste at the time of disposal.
- Determine compliance status with all applicable requirements prior to disposal.
- Contact the RCRA/Superfund Hotline at (800) 424-9346 or your regional US EPA office for guidance concerning case specific disposal issues.

Protective Measures During Repair and Maintenance of Contaminated Equipment:

- Refer to Section 7.0 - Special Protection Information.
- Drain and purge equipment, as necessary, to remove material residues.
- Use gloves constructed of impervious materials such as heavy nitrile rubber and protective work clothing if direct contact is anticipated.
- Eliminate heat and ignition sources.
- Do not allow oil to be injected into the skin from high pressure leaks in hydraulic systems.
- Wash exposed skin thoroughly with soap and water.
- Remove contaminated clothing. Launder before reuse.
- Keep unnecessary persons from hazard area.

6.0 HEALTH HAZARD DATA

Health Hazard Classification (Per 29 CFR 1910.1200):

Highly Toxic	No	Sensitizer	No
Toxic	No	Reproductive Effects	No
Corrosive	No	Mutagen	No
Irritant	No	Target Organ	No

Carcinogen:

Product/Component	CAS No.	Conc. (%)	NTP	IARC	OSHA	Other
CITGO Hydraulic Fluids SUS-2	Mixture	100	No	No	No	No

Toxicity Summary: Generally of a low order of toxicity.

Major Route of Entry: Inhalation of incidental mists or vapors, skin contact with liquid.

Acute Exposure Symptoms:

Inhalation: In enclosed spaces or at elevated temperatures, vapors may reach concentrations sufficient to cause drowsiness, dizziness, headache, nausea, or lung irritation. Elevated mist concentrations above applicable workplace exposure levels may cause lung damage.

Dermal Contact: Mild irritant.

Eye Contact: Mild irritation may result from elevated mist concentrations or direct contact with splashing liquid.

Ingestion: The Saybolt viscosity of the materials represented by this MSDS range from 100 to 199 SUS at 100° F. Accordingly, there is a risk of aspirating this material into the lungs when swallowed. Aspiration may result in severe lung damage. Upon ingestion of large quantities, gastrointestinal discomfort, diarrhea, and headache may occur. Small doses may produce irritation, and diarrhea.

Injection: Injection under the skin, in muscle or into the bloodstream may result in irritation, erythema, edema or severe, permanent tissue damage. Most damage occurs during the first few hours.

Chronic Exposure Symptoms:

Prolonged and/or frequent contact may cause drying, cracking (dermatitis) or folliculitis.

Other Special Effects:

None expected.

Medical Conditions Aggravated by Exposure:

None.

First Aid and Emergency Procedures for Acute Effects:

Inhalation: Move victim to fresh air. If victim is not breathing, immediately begin cardiopulmonary resuscitation (CPR). If breathing is difficult, 100 percent humidified oxygen should be administered by a qualified individual. Seek medical attention immediately.

Dermal: Wash exposed skin with soap and water. Remove contaminated clothing. Launder before use. Seek medical attention if irritation or pain persists.

6.0 HEALTH HAZARD DATA (continued)

Eyes: Flush eyes with large volumes of water. Seek medical attention if irritation, pain or excessive tearing persists.

Ingestion: Do not induce vomiting. If spontaneous vomiting is about to occur, place victim's head below knees. Seek medical attention immediately.

Injection: Injection under the skin, in muscle or into the blood stream is a medical emergency. Seek medical attention immediately.

Notes to Physician:

The Saybolt viscosity of the products represented by this MSDS range between 100 to 199 SUS at 100° F. Upon ingestion, there is a risk of aspiration into the lungs. Aspiration may result in chemical pneumonitis. Removal by careful gastric lavage may be considered.

Subcutaneous or intramuscular injection requires prompt surgical debridement.

7.0 SPECIAL PROTECTION INFORMATION

Ventilation Requirements:

Use in well ventilated area. In confined space, mechanical ventilation may be required to keep levels of certain components below applicable workplace exposure levels as evaluated by designated and properly trained personnel.

Applicable Workplace Exposure Levels:

Chemical Component	ACGIH TLV TWA ppm (mg/M^3)	ACGIH TLV STEL/ Ceiling (C) ppm (mg/M^3)	ACGIH TLV Skin notation?	OSHA PEL TWA ppm (mg/M^3)	OSHA PEL STEL/ Ceiling (C) ppm (mg/M^3)	OSHA PEL Skin notation?
Oil Mist, Mineral	(5)	(10)	No	(5)	NE	No

Specific Personal Protective Equipment:

Personal protective equipment should be selected based upon the conditions under which this material is used. A hazard assessment of the work area for PPE requirements should be conducted by a qualified professional pursuant to OSHA regulations.

Respirator: At elevated temperatures, vapor or mist concentrations may exceed applicable workplace exposure levels. Use a NIOSH or MSHA approved organic vapor/mist chemical cartridge respirator when elevated airborne concentrations are anticipated.

Eyes: Safety glasses or chemical splash goggles if splashing is anticipated.

Dermal: Oil impervious gloves if frequent or prolonged contact is expected.

Other Clothing or Equipment: Wear body-covering work clothes to avoid prolonged or repeated exposure. Launder contaminated work clothes before reuse.

8.0 TRANSPORTATION AND SPECIAL PRECAUTIONS

Storage: Store below 150° F. Do not apply heat or flame to container. Keep separate from strong oxidizing agents.

8.0 TRANSPORTATION AND SPECIAL PRECAUTIONS (continued)

Caution: Empty containers may contain combustible product residues. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling or disposing of empty containers and/or waste residues of this product.

DOT Information:

Proper Shipping Name:	Petroleum Lubricating Oil
Hazard Class:	Non hazardous
Hazard Identification No.:	None Assigned
Packaging Group:	None Assigned
Placard:	None
Compatibility Category:	Group 33
CHRIS Code:	OLB

9.0 ENVIRONMENTAL DATA

Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA)

Section 313 - Toxic Chemicals:

This product is not known to contain any components in concentrations above *de minimis* levels that are listed as toxic chemicals in 40 CFR Part 372 pursuant to the requirements of Section 313 of SARA.

Section 311/312 - Hazard Categories:

This product may meet one or more of the criteria for the hazard categories defined in 40 CFR Part 370 as established by Sections 311 and 312 of SARA as indicated below:

Immediate (Acute) Health Hazard:	No	Sudden Release of Pressure Hazard:	No
Delayed (Chronic) Health Hazard:	No	Reactive Hazard:	No
Fire Hazard:	No		

Section 302 - Extremely Hazardous Substances:

This product is not known to contain any components in concentrations greater than one percent that are listed as Extremely Hazardous Substances in 40 CFR Part 355 pursuant to the requirements of Section 302(a) of SARA.

Clean Water Act (CWA):

Under the CWA, discharges of crude oil and petroleum products to surface water without proper Federal and State permits must be reported immediately to the National Response Center at (800) 424-8802.

Comprehensive Environmental Response, Compensation & Liability Act (CERCLA) Section 102 Hazardous Substances:

As defined by CERCLA, the term "hazardous substance" does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance.

California Proposition 65 (The Safe Drinking Water and Toxics Enforcement Act):

This material contains components that are known to the State of California to be:

Carcinogenic: No Reproductive Hazard: No

Toxic Substances Control Act (TSCA):

Reported in TSCA Inventory as:	Product	Components
CITGO Hydraulic Fluids SUS-2		X

10.0 LABELING

WARNING: **Oil injected into the skin from high pressure leaks in hydraulic systems can cause severe injury. Most damage occurs during the first few hours. Seek medical attention immediately. Surgical removal of oil may be necessary.**

11.0 REFINED PETROLEUM OILS

The products listed on page one of this MSDS contains one or more of the following base oils:

Chemical / Common Name	CAS No.
Solvent Refined Heavy Paraffinic Distillate	64741-88-4
Solvent Refined Light Paraffinic Distillate	64741-89-5
Solvent Dewaxed Heavy Paraffinic Distillate	64742-65-0
Hydrotreated Light Paraffinic Distillate	64742-55-8
Hydrotreated Heavy Paraffinic Distillate	64742-54-7
Hydrotreated Heavy Naphthenic Distillate	64742-52-5
Hydrotreated Neutral Oils	72623-87-1

MATERIAL SAFETY DATA SHEET
LIQUI-NOX™

Manufactured by:
ALCONOX, INC.
9 EAST 40TH STREET
NEW YORK, NY 10016

TELEPHONE NUMBER FOR EMERGENCY: CHEM-TEL 1-800-255-3924
TELEPHONE NUMBER FOR INFORMATION: (212) 532-4040

SECTION I: IDENTIFICATION

Product Name (As appears on Label):	LIQUI-NOX™
CAS Registry Number:	NOT APPLICABLE
Date Prepared:	JULY 29, 1993
Chemical Family:	ANIONIC LIQUID DETERGENT

SECTION II: HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

THERE ARE NO HAZARDOUS INGREDIENTS IN LIQUI-NOX AS DEFINED BY THE OSHA STANDARD 29 CFR 1910 SUBPART Z, THE HAZARDOUS SUBSTANCE LIST.

SECTION III: PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point:	214°F
Vapor Pressure (mm Hg):	NO DATA
Vapor Density (AIR =1):	NO DATA
Specific Gravity (Water=1):	1.075
Melting Point:	NOT APPLICABLE
Evaporation Rate (Butyl Acetate = 1):	SLOWER
Solubility in Water:	COMPLETELY SOLUBLE IN ALL PROPORTIONS
Appearance:	YELLOW LIQUID, NEARLY ODORLESS

SECTION IV: FIRE AND EXPLOSION DATA

Flash Point:	NONE (CLEVELAND OPEN CUP)
Flammable Limits:	NOT APPLICABLE LEL: NO DATA UEL: NO DATA
Extinguishing Media:	WATER, DRY CHEMICALS, CO_2, FOAM
Special Firefighting Procedures:	SELF-CONTAINED POSITIVE PRESSURE BREATHING APPARATUS AND PROTECTIVE CLOTHING SHOULD B WORN FIGHTING FIRES INVOLVING CHEMICALS.
Unusual Fire and Explosion Hazards:	NONE.

National Fire Protection Association 704 Labeling:
Degree of Hazard: 0 = Insignificant, 1 = slight, 2 = moderate, 3 = high, 4 = extreme

RED (FIRE):	0
BLUE (HEALTH):	0
YELLOW (REACTIVITY):	0
WHITE (SPECIAL):	0

SECTION V: REACTIVITY DATA

Stability:	STABLE
Conditions to Avoid:	NONE
Incompatibility (Materials to Avoid):	OXIDIZING OR ALKALINE SOLUTIONS.
Hazardous Decomposition or Byproducts:	MAY RELEASE SO_2 ON BURNING.

SECTION VI: HEALTH HAZARD DATA

Routes of Entry: Inhalation?: NO Skin: YES Ingestion: YES

Health Hazards (Acute and Chronic: SKIN CONTACT MAY PROVE LOCALLY IRRITATING, CAUSING DRYING AND/OR CHAPPING. INGESTION MAY CAUSE DISCOMFORT AND/OR DIARRHEA.

Carcinogenicity: NTP?: NO IARC Monographs?: NO OSHA Regulated?: NO

Signs and Symptoms of Exposure: PROLONGED SKIN CONTACT MAY CAUSE DRYING AND/OR CHAPPING.

Medical Conditions Generally Aggravated by Exposure: NOT ESTABLISHED. UNNECESSARY EXPOSURE TO THIS PRODUCT OR ANY INDUSTRIAL CHEMICAL SHOULD BE AVOIDED.

Emergency and First Aid Procedures: Eyes - IMMEDIATELY FLUSH WITH WATER FOR AT LEAST 15 MINUTES
Skin - FLUSH WITH PLENTY OF WATER
Ingestion - DRINK LARGE QUANTITIES OF WATER OR MILK.
SEE A PHYSICIAN FOR DISCOMFORT.

SECTION VII: PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken if Material is Released or Spilled: MATERIAL FOAMS PROFUSELY. FOR SMALL SPILLS RECOVER AS MUCH AS POSSIBLE WITH ABSORBENT MATERIAL AND FLUSH REMAINDER TO SEWER. MATERIAL IS BIODEGRADABLE.

Waste Disposal Method: SMALL QUANTITIES MAY BE DISPOSED OF IN SEWER. LARGE QUANTITIES SHOULD BE DISPOSED OF IN ACCORDANCE WITH LOCAL ORDNANCES FOR DETERGENT PRODUCTS

Precautions to be Taken in Storing and Handling: NO SPECIAL PRECAUTIONS IN STORING. USE PROTECTIVE EQUIPMENT WHEN HANDLING UNDILUTE MATERIAL.

Other Precautions: NO SPECIAL REQUIREMENTS OTHER THAN GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES EMPLOYED WITH ANY INDUSTRIAL CHEMICAL.

VIII: CONTROL MEASURES

Respiratory Protection (Specify Type):	NOT REQUIRED
Ventilation: - Local Exhaust:	NORMAL
- Special:	NOT REQUIRED
- Mechanical:	NOT REQUIRED
- Other:	NOT REQUIRED
Protective Gloves:	IMPERVIOUS GLOVES ARE RECOMMENDED.
Eye protection:	GOGGLES AND/OR SPLASH SHIELDS ARE RECOMMENDED.
Other Protective Clothing or Equipment:	NOT REQUIRED
Work/Hygienic Practices:	NO SPECIAL PRACTICES REQUIRED.

THE INFORMATION HEREIN IS GIVEN IN GOOD FAITH BUT NO WARRANTY IS EXPRESSED OR IMPLIED
on [illegible]

RECD NOV 13 1986

INDUSTRIAL HYGIENE, TOXICOLOGY, AND MATERIAL SAFETY DATA SHEET

NOTE: NO REPRESENTATION IS MADE AS TO THE ACCURACY OF THE INFORMATION HEREIN. SEE PAGE 7 FOR CONDITIONS UNDER WHICH DATA ARE FURNISHED.

Trade Name and Synonyms
01691 DIESEL ENGINE OIL 13

Manufacturer's Name
Texaco Inc.

Emergency Telephone No.
(914) 831-3400 ext. 204

Address
P.O. Box 509 Beacon, NY 12508

Chemical Name and/or Family or Description
Diesel Engine Oil

THIS PRODUCT IS CLASSIFIED AS: X NOT HAZARDOUS:

____ HAZARDOUS BY DEFINITION NO.(S) ____ ON ATTACHED EXPLANATION SHEETS

WARNING STATEMENT:
WARNING! AVOID SKIN CONTACT WITH USED MOTOR OILS

OCCUPATIONAL CONTROL PROCEDURES

Protective Equipment (Type)

Eyes: Chemical type goggles or face shield optional.

Skin: Exposed employes should exercise reasonable personal cleanliness; this includes cleansing exposed skin areas several times daily with soap and water, and laundering or dry cleaning soiled work clothing at least weekly.

Inhalation: None required if exposures are within permissible concentrations; see below.

Ventilation: Adequate to meet permissible concentrations.

Permissible Concentrations:

Air: 5 mg/cubic meter of air for mineral oil mist averaged over an 8 hour daily exposure (ACGIH 1984-85).

EMERGENCY AND FIRST AID PROCEDURES

First Aid

Eyes: As with most foreign materials, should eye contact occur, flush eyes with plenty of water.

Skin: None considered necessary.

Ingestion: None considered necessary.

Inhalation: None considered necessary.

Other Instructions: None.

N.D. - Not Determined N.A. - Not Applicable
< - Less Than > - Greater Than

PHYSIOLOGICAL EFFECTS:

Code No. 01691

Effects of Exposure

Acute:

Eyes: Believed to be minimally irritating.

Skin: Believed to be minimally irritating.

Respiratory System: Believed to be minimally irritating if not in excess of permissible concentrations; see page 1.

Chronic: N.D.

Other: -

Sensitization Properties:

Skin: Yes ___ No ___ Unknown X Respiratory: Yes ___ No ___ Unknown X

Median Lethal Dose (LD_{50} LC_{50})(Species)

Oral: Believed to be > 5 g/kg (rat); practically non-toxic

Inhalation: N.D.

Dermal: Believed to be > 3 g/kg (rabbit); practically non-toxic

Other: N. D.

Irritation Index, Estimation of Irritation (Species)

Skin: Believed to be < 0.5/8.0 (rabbit); no appreciable effect

Eyes: Believed to be < 15/110 (rabbit); no appreciable effect

Symptoms of Exposure: None expected other than possible minimal irritation

FIRE PROTECTION INFORMATION

Ignition Temp. °F. N.D. Flash Point °F. (Method) 490° F COC

Flammable Limits (%) Lower N.D. Upper N.D.

Products Evolved When Subjected to Heat or Combustion:

Carbon monoxide and carbon dioxide may be formed on burning in limited air supply.

Recommended Fire Extinguishing Agents And Special Procedures:

According to the National Fire Protection Association Guide, use water spray, dry chemical, foam, or carbon dioxide.
Water or foam may cause frothing. Use water to cool fire-exposed containers. If a leak or spill has not ignited, use water spray to disperse the vapors and to provide protection for persons attempting to stop the leak.

Unusual or Explosive Hazards:

None.

N.D. - Not Determined N.A. - Not Applicable
< - Less Than > - Greater Than

ENVIRONMENTAL PROTECTION

Code No. 01691

Waste Disposal Method:
Under RCRA, it is the responsibility of the user of products to determine, at the time of disposal, whether product meets RCRA criteria for hazardous waste. This is because product uses, transformations, mixture, processes, etc. may render the resulting material hazardous. (See Remarks for Waste Classification.)

Procedures in Case of Breakage or Leakage: (Transportation Spills Call CHEMTREC (800) 424-9300)
Contain spill if possible. Wipe up or absorb on suitable material and shovel up.

Remarks:
Waste Classification: Product has been evaluated for RCRA characteristics and does not meet criteria of a hazardous waste if discarded in its purchased form.

PRECAUTIONS

WARNING! AVOID SKIN CONTACT WITH USED MOTOR OILS

Used gasoline motor oils have caused skin cancer in laboratory animals when repeatedly applied and left in place between applications.
In case of skin contact, promptly wash thoroughly with soap and water.
Oil-soiled clothing should be cleaned before reuse.

Requirements for Transportation, Handling and Storage:
Minimum feasible handling temperatures should be maintained. Periods of exposure to high temperatures should be minimized. Water contamination should be avoided.

DOT Proper Shipping Name: N.A.
DOT Hazard Class (if applicable): N.A.

CHEMICAL AND PHYSICAL PROPERTIES

Boiling Point (°F) High
Vapor Pressure Low (mmHg)

Specific Gravity 0.9129 (H_2O=1)
Vapor Density N.D. (Air=1)

Appearance and Odor Dark pale liquid

pH of undiluted product N.A.
Solubility Neglig

Percent Volatile by Volume Nil
Evaporation N.D. ( )=1

Viscosity 198.3 cSt @ 40°C
Other -

Hazardous Polymerizations ____ Occur X Do not occur

The Material Reacts Violently With: (If others is checked below, see additional comments on page 6 for futher details)

Air	Water	Heat	Strong Oxidizers	Others	None of These
			X		

N.D. - Not Determined N.A. - Not Applicable
< - Less Than > - Greater Than

COMPOSITION

Code No. 01691

Chemical/Common Name	CAS No.	Exposure Limit	Range in %
*Adtv. Pkg. containing calcium phenolate, alkenyl succinimide			11.00 - 19.99
Solvent-dewaxed heavy paraffinic petroleum distillates	64742650	5.0 mg/m3 TWA	35.00 - 49.99
Severely solvent-refined hydrotreated heavy naphthenic petroleum distillates	64742525	5.0 mg/m3 TWA- ACGIH	35.00 - 49.99

*Hazardous according to OSHA (1910.1200) or one or more state Right-To-Know lists.

01691 DIESEL ENGINE OIL 13

WARNING! AVOID SKIN CONTACT WITH USED MOTOR OILS

Used gasoline motor oils have caused skin cancer in laboratory animals when repeatedly applied and left in place between applications.
In case of skin contact, promptly wash thoroughly with soap and water.
Oil-soiled clothing should be cleaned before reuse.

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Solvent-dewaxed heavy paraffinic petroleum distillates	64742650	35.00 - 49.99
Severely solvent-refined hydrotreated heavy naphthenic petroleum distillates	64742525	35.00 - 49.99

•Hazardous according to OSHA (1910.1200) or one or more state Right-To-Know lists.

HMIS

Health : 0 Reactivity : 0
Flammability: 1 Special : -

CAUTION: Misuse of empty containers can be hazardous. Empty containers can be hazardous if used to store toxic, flammable, or reactive materials. Cutting or welding of empty containers might cause fire, explosion or toxic fumes from residues. Do not pressurize or expose to open flame or heat. Keep container closed and drum bungs in place.

HEALTH EMERGENCY TELEPHONE: (914) 831-3400 (EXT. 204)

Texaco Inc.
2000 Westchester Avenue
White Plains, New York 10650

For Additional Information Concerning:

Fuels/Lubricants/Antifreezes
call (914) 831-3400 (EXT.204)
Chemicals/Additives
call (409) 722-8381
Transportation Spills
call CHEMTREC (800) 424-9300

ADDITIONAL COMMENTS	Code No. 01691

TEXACO INTENDS TO COMPLY FULLY WITH PROVISIONS OF THE TOXIC SUBSTANCES CONTROL ACT STATE OF MICHIGAN CRITICAL MATERIALS ACT (REVISED 1985)

To determine applicability or effect of any law or regulation with respect to the product, users should consult his legal advisor or the appropriate government agency. Texaco does not undertake to furnish advice on such matters.

By R. T. Richards Title Mgr. Env. Conservation & Toxicology

Date 01-10-86 ☐ New ☒ Revised, Supersedes 11-06-85

N.D. - Not Determined N.A. - Not Applicable

< - Less Than > - Greater Than

USA and WORLDWIDE

September 29, 1995

Material Safety Data Sheet

UNLEADED REGULAR GASOLINE (Including Reformulated)

PHILLIPS 66 COMPANY
A Division of Phillips Petroleum Company
Bartlesville, Oklahoma 74004

PHONE NUMBERS
Emergency: (918) 661-8118
General MSDS Information: (918) 661-3709
For Additional MSDSs: (918) 661-3709

A. Product Identification

Synonyms: Motor Fuel; Petrol
Chemical Name: Mixture
Chemical Family: Hydrocarbon
Chemical Formula: Mixture
CAS Reg. No.: Mixture
Product No.: 12050, 12051, 12750, 12751, 12080, 12081, 11050, 11051, 12180, 12181, 12170, 12171, 12280, 12281, 12270, 12271, 12380, 12381, 12370, 12371

Product and/or Components Entered on EPA's TSCA Inventory: YES

This product is in U.S. commerce, and is listed in the Toxic Substances Control Act (TSCA) Inventory of Chemicals; hence, it may be subject to applicable TSCA provisions and restrictions.

B. Components

Ingredients	CAS Number	% By Wt.	OSHA PEL	ACGIH TLV
Gasoline, including:	8006-61-9	100	300 ppm	300 ppm
Benzene	71-43-2	<5	10 ppm (1)	10 ppm
Toluene	108-88-3	1-35	100 ppm	50 ppm
Ethyl Benzene	100-41-4	0-4	100 ppm	100 ppm
Xylenes (mixed isomers)	1330-20-7	1-10	100 ppm	100 ppm
Methyl-tert-Butyl Ether	1634-04-4	<16	NE	NE
1,2,4-Trimethyl Benzene	95-63-6	0.5-2.5	25 ppm (2)	25 ppm (2)
Isopentane	78-78-4	<20	NE	NE
n-Butane	106-97-8	<10	800 ppm	800 ppm

(1) **Areas covered by the Benzene Standard, 29 CFR 1910.1028, will have a 1 ppm 8 hour TWA and 5 ppm STEL.**
(2) **For Trimethylbenzene**

NA - Not Applicable NE - Not Established

C. Personal Protection Information

Ventilation: Use adequate ventilation to control concentration below recommended exposure limits.

Respiratory Protection: For concentrations exceeding the recommended exposure limit, use appropriate NIOSH/MSHA approved air purifying respirator. When entry into or exit from concentrations of unknown exposure, use NIOSH/MSHA approved self-contained breathing apparatus (SCBA).

Eye Protection: Use safety glasses with side shields and face shield for splash protection.

Skin Protection: Use gloves resistant to the material being used. (Viton, nitrile, neoprene). Use full-body, long sleeved garments to prevent skin contact.

NOTE: Personal protection information shown in Section C is based upon general information as to normal uses and conditions. Where special or unusual uses or conditions exist, it is suggested that the expert assistance of an industrial hygienist or other qualified professional be sought.

D. Handling and Storage Precautions

Do not get in eyes, on skin or on clothing. Do not breathe vapors, mist, fume or dust. Do not swallow. May be aspirated into lungs. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. Wash thoroughly after handling. Launder contaminated clothing before reuse. Use only with adequate ventilation.

Keep away from heat, sparks, and flames. Store in a well-ventilated area. Store in tightly closed container. Bond and ground during transfer.

E. Reactivity Data

Stability:	Stable
Conditions to Avoid:	Not Applicable
Incompatibility (Materials to Avoid):	Oxygen and strong oxidizing agents
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid:	Not Applicable
Hazardous Decomposition Products:	Carbon oxides and various hydrocarbons when burned.

F. Health Hazard Data

Recommended Exposure Limits:

See Section B.

Acute Effects of Overexposure:

Eye: May cause mild irritation, with stinging and redness of the eyes.

Skin: May cause mild irritation. Repeated or prolonged contact may cause defatting of the skin, resulting in dermatitis.

Inhalation: May cause headache, nausea, weakness, sedation, and unconsciousness at high concentrations (>300 ppm).

Ingestion: May be slightly irritating to intestines. May cause nausea. If swallowed, may be aspirated resulting in inflammation and possible fluid accumulation in the lungs. The oral LD50, rat, for unleaded gasoline is 18.8 ml/kg.

Subchronic and Chronic Effects of Overexposure:

Unleaded gasoline has produced kidney cancer in male rats only. No comparable kidney disease is known to occur in humans.

Gasolines generally contain benzene which has been designated a carcinogen by the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), and the Occupational Safety and Health Administration (OSHA). Benzene may produce blood changes which include reduced platelets, red blood cells, and white blood cells. Also, aplastic anemia, and acute nonlymphotic leukemia. Benzene has produced fetal death in laboratory animals and caused chromosome changes in humans and mutation changes in cells of other organisms.

Isopentane did not produce kidney damage in a subchronic oral laboratory study or in a subchronic inhalation exposure to 4500 ppm isopentane alone or 1000 ppm of a 50/50 mixture of isobutane and isopentane.

Exposure of pregnant rats during gestation to toluene at levels 250 ppm and higher produced some maternal toxicity and embryo/fetotoxicity. A lifetime inhalation study in rats did not show any toxic effects even at the high dose of 300 ppm.

Behavioural signs of hearing loss were observed in rats exposed to toluene subchronically at levels of 1000 ppm or more. Comparable effects have not been reported in humans.

Methyl-tert-butyl Ether (MTBE) is not readily absorbed through the skin and inhaled MTBE is rapidly eliminated from the body. Inhalation studies determined MTBE is not a neurotoxin, however, high concentrations (8000 ppm) can cause central nervous system depression. Inhalation of MTBE does not cause fetal malformations nor does it interfere with the reproductive capacity.

Ethylbenzene has caused fetotoxicity and liver and kidney injury in laboratory animals. No comparable injury has been reported in humans.

Liver and kidney changes have been noted in long term studies in animals exposed to xylenes. Fetotoxicity has been observed in animals with subchronic exposure to mixed xylenes at concentrations approximately five times the permissible exposure limit.

An epidemiology study of workers exposed to two isomers of trimethylbenzene had symptoms of nervousness, tension and anxiety, and asthmatic bronchitis. In addition, after inhalation of 60 ppm measured as hydrocarbon vapor, the workers' peripheral blood showed a tendency to hypochromic anemia and a deviation from normal in the coagulability of the blood.

Other Health Effects:

Combustion, a normal use of gasoline, results in an exhaust that has been associated with skin cancer in laboratory animals. Skin cancer was observed in these animals when exhaust was concentrated and repeatedly applied to the skin. This is not a normal route of exposure relevant to humans.

Combustion (burning) of most carbon-containing material forms carbon monoxide. Carbon monoxide inhalation may cause carboxyhemoglobinemia. Chronic exposure to carbon monoxide causes fatigue, poor memory, loss of sensation in fingers, visual disturbances and insomnia. Carboxyhemoglobinemia is frequently misdiagnosed as flu.

Sensitive sub-populations to the inhalation of carbon monoxide exist. Carbon monoxide displaces oxygen in the bloodstream and therefore, can adversely effect people with pre-existing heart disease, pregnant women and smokers.

A Toxicity Study Summary for Toluene is available upon request.

A Toxicity Study Summary for Isopentane, Commercial Grade, is available upon request.

Health Hazard Categories:

	Animal	Human		Animal	Human
Known Carcinogen	_X_	_X_	Toxic	___	___
Suspect Carcinogen	___	___	Corrosive	___	___
Mutagen	_X_	___	Irritant	___	___
Teratogen	___	___	Target Organ Toxin	_X_	_X_
Allergic Sensitizer	___	___	Specify -	Blood Toxin; Reproductive Toxin-Embryo/Fetotoxin; Lung-Aspiration Hazard Kidney Toxin; Liver Toxin	
Highly Toxic	___	___			

First Aid and Emergency Procedures:

Eye: Flush eyes with running water for at least fifteen minutes. If irritation or adverse symptoms develop, seek medical attention

Skin: Wash skin with soap and water for at least fifteen minutes. If irritation or adverse symptoms develop, seek medical attention

Inhalation: Remove from exposure. If breathing is difficult, give oxygen. If breathing ceases, administer artificial respiration followed by oxygen. Seek immediate medical attention.

Ingestion: Do not induce vomiting. Seek immediate medical attention.

Note to Physician: Gastric lavage using a cuffed endotracheal tube may be performed at your discretion.